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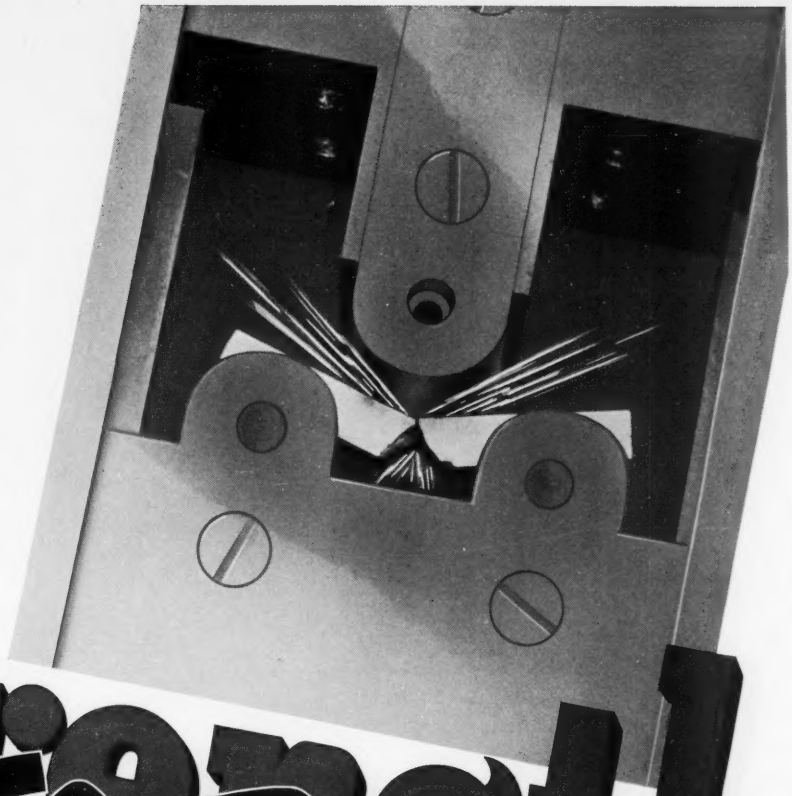

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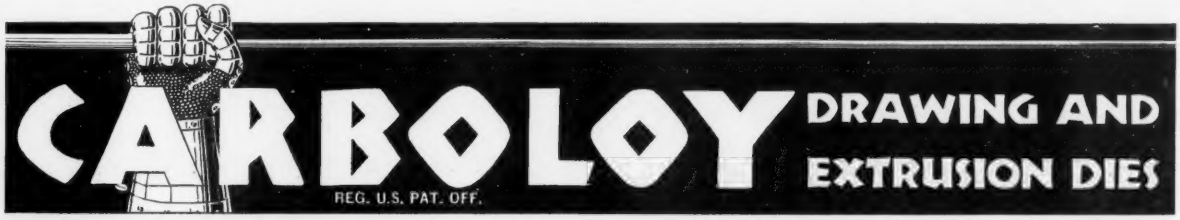

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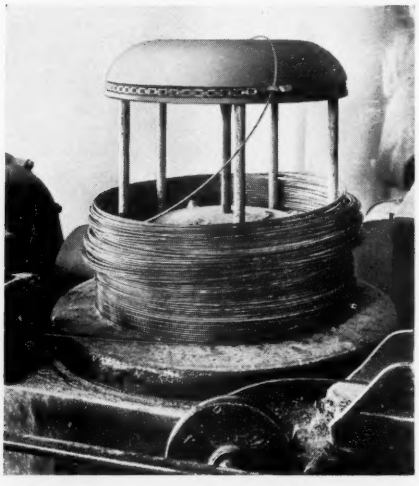

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip Wire Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 12 APRIL, 1937 No. 4

Designated as

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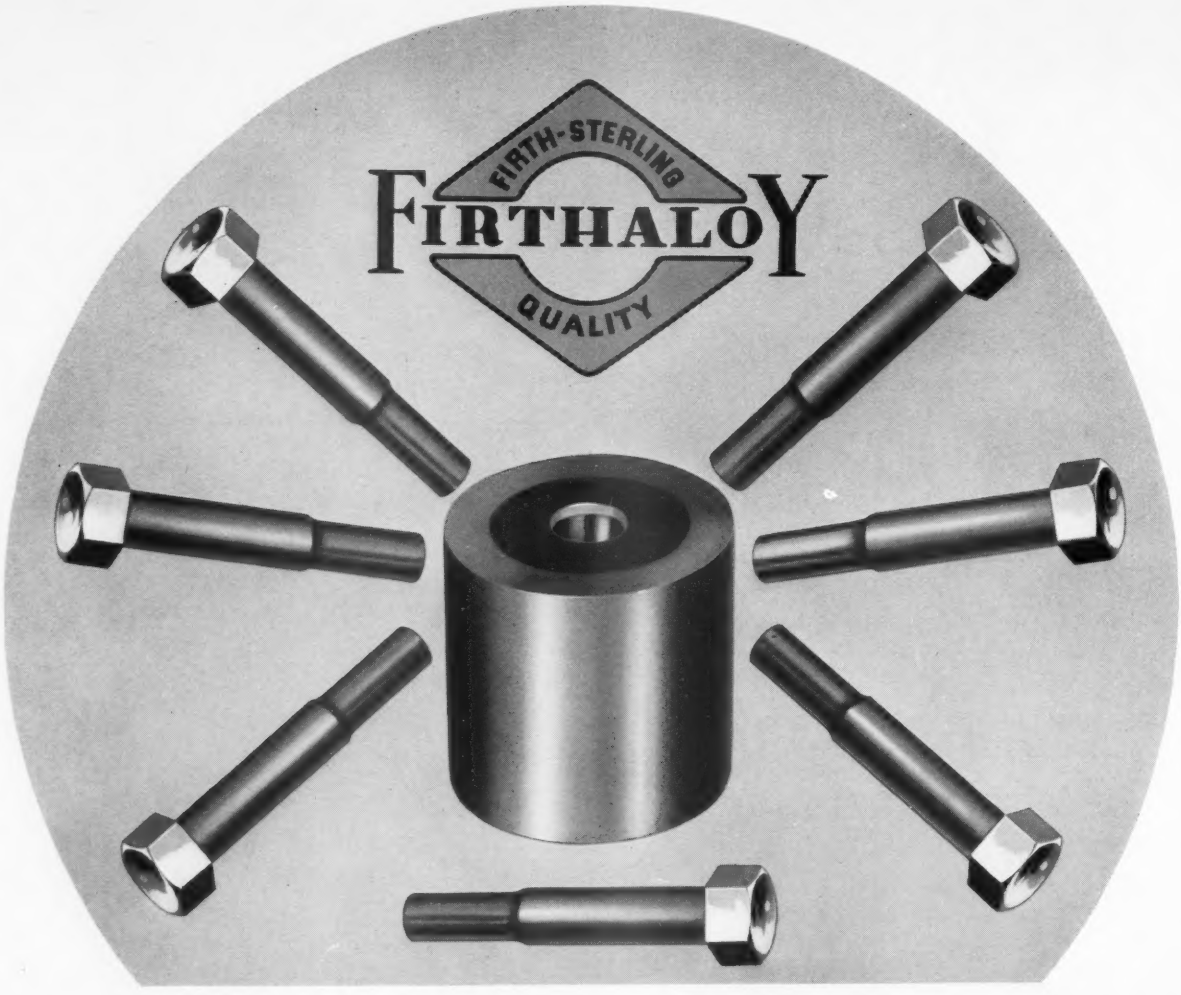

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Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING--- EXTRUDING --- FORMING --- FABRICATING

Vol. 12 APRIL 1937 No. 4

Some Practical Notes On "Casting" Wire

By William Gould, M. E.
Consulting Wire Mill Engineer, New York, N. Y.

The purpose of this article is to explain a simple method for obtaining "dead-cast" wire. An outline of the results obtained through tilting dies and a discussion of the equipment necessary to control the "cast" by movement of the die in one vertical plane. ✦ ✦ ✦

WITHOUT in any way attempting a rigid definition of "cast" in wire we can say, briefly, that "dead cast" wire is wire which when permitted to lie unrestrained by any external forces will have zero vertical pitch and proper coil diameter. We can assume that its internal stresses are balanced. When the internal stresses are unbalanced we get "off cast" or "wild wire". This evidences itself in numerous ways. In some cases it takes the form of the well known "Figure 8". In others it takes the form of a vertical helix of large pitch and will fly off the block when released. The purpose of this article is to explain a simple method for obtaining the first of these conditions, viz. "dead cast" wire.

✦ ✦ ✦

IT is not necessary to go into any lengthy explanation of the importance of "cast" in wire. There is, of course, the practical consideration of handling in the wire mill as well as ease of stripping since "casting" is also assumed to mean setting the die for proper coil diameter so that the wire will not hug the block. In the customer's plant, especially if he is a spring maker, varying internal stress such as is present in "wild" or "off cast" wire will give erratic and undesirable results leading to loss of time and increased waste of material.

A STUDY of the wire-drawing practice at the mill of one of the leading spring wire manufacturers (Dec. 1933) also raised the question of "cast" as a production problem concerned with wastage of time as well as wire in the wire-drawing operation itself due to the length of time taken by the operator in setting his die where "cast" requirements are rigid.

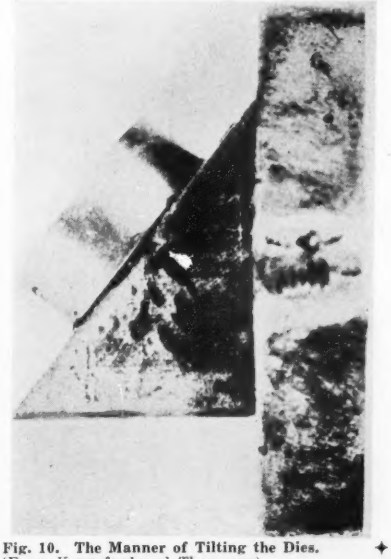

Fig. 10. The Manner of Tilting the Dies. (From Kenneford and Thompson) ✦

✦ ✦ ✦

The Work of Professors A. S. Kenneford and F. C. Thompson of the Victoria Inst. at Manchester

IN the 1933 Carnegie Institute Memoirs of the British Iron and Steel Institute, A. S. Kenneford, M. Sc. and F. C. Thompson, D. Met., M. Sc. (The Dept. of Metallurgy, The Victoria Institute of Manchester) published the results of some experimental work done by them under the title "Some Experiments Bearing on the 'Casting' of Wire." They examined "the factors which influence the curvature of a wire as it leaves the die, together with a few determinations of the properties of the wires and some pertinent measurements of the pull required". They investigated also, "the effects of the angle of tilt of the drawing die in relation to the angle and contour of the die, reduction of area in the pass, previous cold-work, the speed of drawing, the temperature, and the lubricant".

✦ ✦ ✦

IT is only that part of their work which concerns itself with the effect of tilting the die about a horizontal axis through the center of the die which we will describe

TABLE I

Angle of Tilt	Radius of Curvature		Pull	Angle of Tilt	Radius of Curvature		Pull
d°	cms.	ins.	lbs.	deg.	cms.	ins.	lbs.
0	α	α	50	25	22.00	8 21/32	55
2½	41.00	16 9/64	50	30	26.50	10 7/16	57
5	33.75	13 9/32	50	35	31.00	12 13/64	60
10	25.50	10 1/32	51	40	37.00	14 9/16	65
15	21.50	8 15/32	52	45	42.00	16 17/32	70
20	22.00	8 21/32	53				

here. The dies used were of tungsten-carbide with an 11 degree entrance angle. A reduction of area of 21.0% was taken for the pass. The tests were made on a .085% carbon steel with an original diameter of 0.072 inch, which was in the full annealed condition and limed and water-coated.

✦ ✦ ✦

THE drawing die was fixed (see Fig 10) at angles of from 2½° to 45° to the axis of pull and despite the low carbon content and the full annealing the wires drawn in this manner had a definite curvature depending on the angle of tilt of the die with respect to the horizontal pull of the wire grips. The results are shown on Table 1 which is taken from their Paper except that the Radius of Curvature is also given in inches.

✦ ✦ ✦

Mechanical Properties of the Wires

TABLE III gives the results in Tabular form of tensile tests made on the above wires. (Each value is the average of ten readings). The authors noted the mode of exit of the wire from the tilted die. They reported that the cross-section of the wire remains cylindrical and the cross-sectional area identical with that drawn through the untilted die. They stated also "that the wire comes out of the die along the axis of the latter, and is then bent through the arc of a circle of very small radius into the direction of the applied pull," as shown in Fig. 2.

✦ ✦ ✦

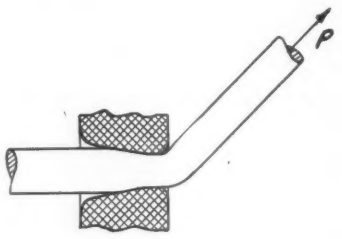

FIG. 2.
(From Kenneford and Thompson)

TORSION tests showed a small increase in the number of twists withstood as the angle of tilt was increased from 0° to 10° but these results show no appreciable change in the properties of the wire. Table IV gives the results of these tests.

THE microstructures of the wires drawn through the die at angles of 0° and 45° are shown in Figs. 11 and 12. As stated by the authors "no difference has yet been detected." Likewise, Mr. E. J. P. Fisher during the discussion of his Paper on "The Properties and Manufacture of Spring Wire" at the 1934 Meeting of the Wire Association at New York City stated "We have pulled wires through dies at different angles and tried to see if there was any difference in the structure after they came out. And we cannot detect the difference. There is a difference, naturally, in the stresses. I am sure there must be."

✦ ✦ ✦

IN their "Conclusion", Professors Kenneford and Thompson point out, among other things, that "In the foregoing an attempt has been made to obtain data which may throw light on one aspect of the problem of "cast" in wire. This problem in industry is overcome quite empirically by, if necessary, tilting the die slightly (at the most 5°) usually in two planes at right angles by means of small pieces of metal packed in behind the die and its holder."

TABLE III—TENSILE TESTS

Angle of Tilt	Maximum Stress	Elongation On 2 Ins.	Reduction of Area	Angle of Tilt	Maximum Stress	Elongation On 2 Ins.	Reduction of Area
Degrees	Tons/Sq. In.	Per Cent	Per Cent	Degrees	Tons/Sq. In.	Per Cent	Per Cent
0	32.20	14.0	65.3	25	33.39	13.5	63.5
2½	32.20	14.0	65.3	30	32.20	14.0	65.2
5	33.40	14.0	64.2	35	31.90	14.5	66.4
10	31.80	14.5	66.5	40	33.00	13.5	63.2
15	32.35	14.0	65.2	45	32.32	14.0	65.2
20	32.20	14.0	65.3				

"IN the case of the coil of wire shown in Fig. 9 the whole of the trouble appears to be located in the first few turns. This coil of wire was disentangled and suspended with its axis horizontally, when it was seen that the coil consisted of two distinct helices, whose axis were at right angles (see Fig. 13). The first helix, which was found to consist of the beginning of the coil and which was fairly short—containing only about eight turns—was apparently the whole cause of the trouble, for when it was removed, the rest of the wire behaved perfectly."

✦ ✦ ✦

"THE first portion of the coil referred to was found to correspond with that part of the wire which spirals down from the top of the block to the bottom at the commencement of drawing, and consequently the conditions were similar to those obtaining when the die is tilted in a vertical plane. The wire drawn at the beginning of the run, therefore, was given curvatures in two planes at right angles. It appears that this double curvature would account for the behavior of this portion of the wire."

✦ ✦ ✦

"IF it is found that the above applies in other cases, the trouble might be overcome by a modified design of block—a possible remedy being the incorporation of the jaws for gripping the wire at the bottom, instead of, as at present, at the top."

✦ ✦ ✦

"IT will be seen that in the present work only the effects of the actual drawing on the curvature of the wire have been examined. Clearly this is only one of the factors involved, and the influence of the secondary curvature imposed on the wire by the coiling on to the block must also be of importance."

✦ ✦ ✦

IT is known, as stated by Kenneford and Thompson and verified by others, that "the wire comes out of the die along the axis of the latter and is then bent through the arc of a circle of very small radius into the direction of the applied

TABLE IV—TORSION TESTS

Angle of Tilt degrees	Twists To Fracture On 100 Diameters	Angle of Tilt degrees	Twists To Fracture On 100 Diameters
0	112	25	124
2½	119	30	125
5	121	35	126
10	124	40	125
15	125	45	125
20	125		

(From Kenneford and Thompson)

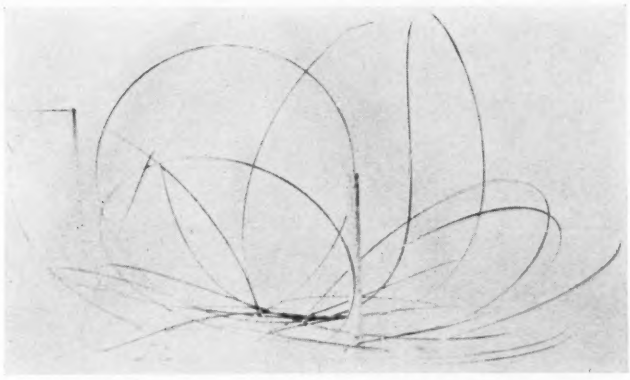

Fig. 9. The "Cast" in a "Post Office" Bronze Wire; reduction of area, 21%. (From Kenneford and Thompson)

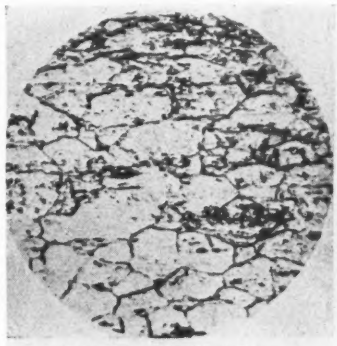

FIG. 11.—Untilted Die.

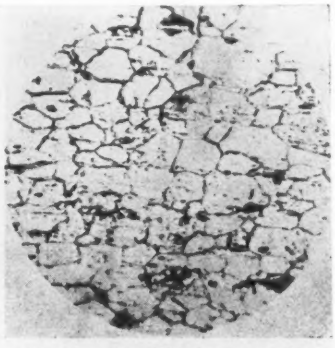

FIG. 12.—Die Tilted through 45°.

Figs. 11 and 12. Microstructures of 0.085% Carbon Steel Wire, drawn through tungsten-carbide dies; reduction of area, 21% x 250 (reduced in reproduction to four-fifths linear). (From Kenneford and Thompson)

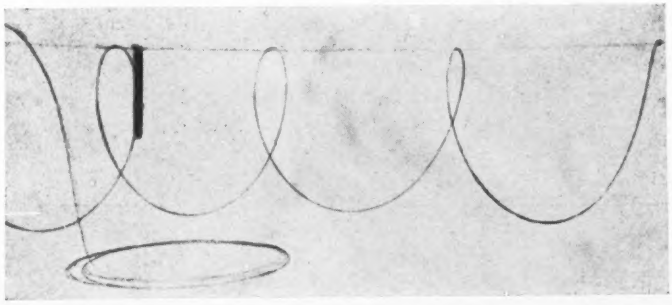

Fig. 13. Coil shown in Fig. 9 after Disentanglement; two distinct helices with axes at right angles. (From Kenneford and Thompson)

✦ ✦ ✦ ✦ ✦ ✦ ✦

pull", as shown in Fig. 2. Therefore, if instead of tilting the die we were to change the direction of the applied pull, we could duplicate the results obtained by tilting the die. It also follows, that with the pull fixed shifting the die in a vertical plane at right angles to the axis of the die will also produce curvature in the wire drawn. Since in practice the applied pull of the wire grips is fixed in direction by the relationship of the wire grips and the wire drawing block then we have the last described condition. We need only to fix the relation of the die to these elements and to show that the curvature of the wire can be definitely controlled.

✦ ✦ ✦

AS a result of experiments made by the author of these "Notes" in the latter half of 1934 on a 4 block Morgan-Connor Continuous Wire Drawing Machine in the mill of which he was then Superintendent, he came to the conclusion that the curvature of the wire could be definitely fixed. Let us assume, as shown diagrammatically in Fig. 5 (a) that a wire is drawn through the die by means of an axial force; the wire will be straight, see Fig. 5 (b). If thereafter the pull is inclined as shown in Fig 6 (a) the wire will take a definite curvature indicated by Fig. 6 (b). While if the pull is still further inclined the coil diameter decreases as shown by Figs. 7 (a) and (b). It is to be understood that the pull in the above illustrations remains in the horizontal plane of the die axis. Relatively speaking it can also be considered that the point of application of the pull remains fixed and that the die has been shifted from its original position; its axis remaining in its original horizontal plane and paralled to its first position. The further it is offset in this manner, the greater will be the effect upon the curvature of the wire.

✦ ✦ ✦

LET us now consider the effect of vertical motion of the die while its axis remains horizontal and parallel to its "neutral" position. In its "neutral" position as shown in Fig. 1 (a), the wire is drawn by an axial pull and the wire

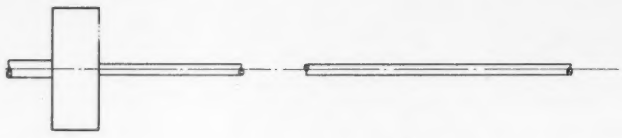

FIG.1a. FIG.1b.

FIG.3a. FIG.3b. FIG.3c.

FIG.4a. FIG.4b. FIG.4c.

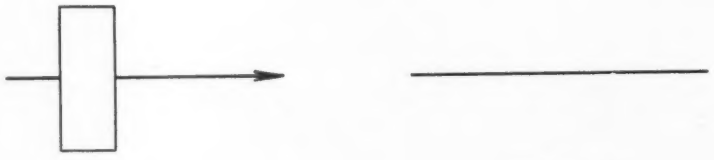

FIG.5a. FIG.5b.

FIG.6a FIG.6b.

FIG.7a. FIG.7b.

will be straight as shown in Fig. 1 (b). This is, of course, the same position as indicated on Fig. 5 (a), When the die is raised vertically with its axis horizontal and parallel to its original position into the position shown on Fig 3 (a) then wire drawn will take the curvature in the vertical plane as shown on Fig. 3 (b). If in practice the die is rigidly fixed in the relative position shown by Fig. 3 (a), wire run up on the block and removed will take the form of the right hand helix shown in Fig. 3 (c).

✦ ✦ ✦

ON the other hand, if the die is lowered below its neutral position under the same conditions as before [see Fig. 4 (a)] then wire

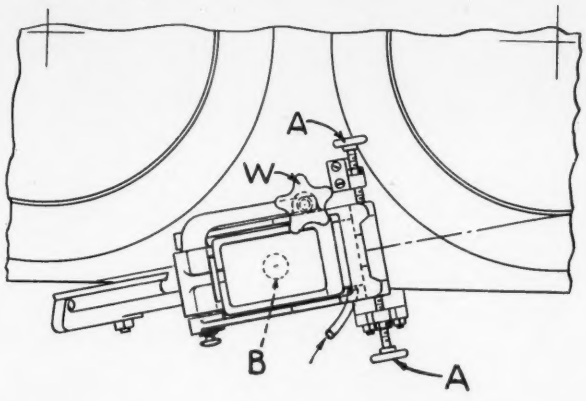

Fig. 8a.

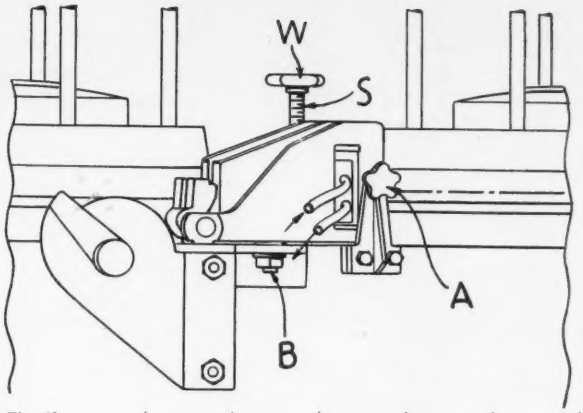

Fig. 8b.

so drawn will assume the conditions shown in Fig. 4 (b). If this relationship exists and the effective pull is supplied by wire grips attached to a rotating block, as in a wire-drawing machine, then the wire will take the form of the left hand helix shown in Fig. 4 (c).

✦ ✦ ✦

Practical Requirements: Equipment

A STUDY of Figs. 8 and 14 will show the mechanical requirements necessary to provide the conditions which will make it possible to control the "cast" by movement of the die in one vertical plane. All surfaces marked "f" as well as the internal and external surfaces of the water-cooled die holder shown must be in horizontal planes or in vertical planes at right angles to the axis of the die. Once set in position the whole mechanism must be held rigid; the die in its holder, the holder by pressure of the soap-box against the die-holder and the die box itself by means of the bolt "B" and the side screws "A".

✦ ✦ ✦

Casting Technique

AFTER setting the new die in its water-cooled holder and checking it for leakage, it is connected to the water line and inserted into the Die Box in the best position according to the judgment of the operator. The wire is pointed and inserted into the die, gripped on the other side and about 4 or 5 turns are run onto the wire drawing block. The machine is stopped and the last turn run up on the block is cut off and held up for inspection. If the coil diameter is too large the die must be pulled toward the operator; if too small it must be moved away from the operator. Also if the strand takes the helical effect shown in Fig. 4 (c), then the die is too low and must be raised or if like Fig. 3 (c) then the die is too high and must be lowered. By gripping the die holder firmly with one hand while carefully loosening the screw S by means of the hand wheel W, the die holder may then be shifted so as to adjust for both elements at once. In this trial and error manner an experienced operator can set a "dead-cast" wire of proper coil diameter with one or at the most two or three tries. Moreover, the "cast" will remain practically the same from coil to coil during the life of the hole although it is good practice to check at the beginning of each coil when the wire is measured by micrometer as well.

✦ ✦ ✦

IT may be well to point out that since the installation of this method of "casting" not a pound of "wild" or "Figure 8" wire has been made in this mill which produces about 125 tons weekly of both high and low carbon wire. Moreover the scrap produced, despite very high standards for "cast", has averaged, by weight, between one-third and one-half of one percent.

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WHILE it is realized that the method of "casting" described in this paper is not the last word on this subject, it is written in the hope that it will be of practical aid to those who are still troubled by this problem. It is also hoped that it may offer some incentive for further investigation of this, as well as other, aspects of wire drawing.

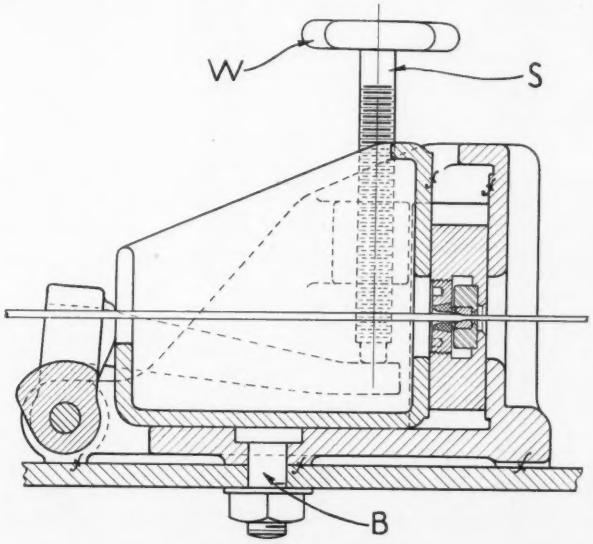

FIG. 14.

The Wire Association Re-Elects Officers

At the Annual Directors Meeting of the Wire Association held in New York, N. Y., March 19th, 1937, the Directors re-elected present officers and laid plans for 1937 meetings.

THE Annual Meeting of the Board of Directors of the Wire Association was held at the Waldorf Astoria Hotel, New York, N. Y., at 10:30 A. M. on March 19, 1937.

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THE meeting was called to order by Ralph K. Clifford, General Superintendent, Continental Steel Corp., Kokomo, Indiana, president of the Wire Association, presiding, and 12 of the 14 Directors, constituting a quorum, were present. The Secretary read the minutes of the previous Directors Meeting and upon request, the minutes of the Annual Wire Association Meeting held in Cleveland, Ohio, in October, 1936. Following this the Treasurer made his annual report to the Directors, who expressed themselves well pleased by the very definite improvement in the financial situation of the Association.

✦ ✦ ✦

THE Secretary advised the Board that one or two other societies, indirectly serving the wire industry, stated they would be glad to supply articles for publication in WIRE AND WIRE PRODUCTS, and the Board authorized the Secretary to proceed along these lines.

✦ ✦ ✦

IN connection with the publication of papers both for the Association and in the publication WIRE AND WIRE PRODUCTS, it was decided to appoint a Publication Committee to pass on such papers in the future. Announcement of the Committee will be made at a later date.

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Cold Working and Cold Heading Division

THE Organization Committee of the Cold Working and Cold Heading Division advised in its report that they had sent out approximately 1,000 announcements and within a period of five weeks had developed 35 new members. They further stated that they expected to have at least 100 to 125 members at the next convention. In this connection it was decided that at least two meetings would be held on the subject of cold working and cold heading at the Atlantic City Meetings, and a committee to develop this division and this work, consisting of Mr. B. L. McCarthy, Chief Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y., Mr. R. L. Wilcox, Vice President, Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., and Mr. A. R. Zapp, Manager Firthaloy Division, Firth Sterling Steel Company, McKeesport, Pa., was appointed.

RALPH K. CLIFFORD
General Supt., Continental Steel Corp.
President, The Wire Association

✦ ✦ ✦

IN discussing the development of the Cold Heading Division, it was brought out that it was necessary to go further into the making of steel than in the present wire practice and that the activities of this division will include open hearth practices so far as they relate to the production of a steel for wire making. There was some discussion relative to the employment of the De Betts test for basic wire products but no definite conclusion was reached.

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FOR the arrangement of the program of the 1937 meetings, Mr. John C. Callaghan, Works Manager, Canada Works, Steel Company of Canada, Ltd., Hamilton, Ontario, Canada, was appointed Chairman of the Program Committee, and the Directors agreed that the Program Committee should consist of the chairman, and two men for the ferrous, two men for the non-ferrous and two men for the cold working and cold heading division.

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Registration Fee and Proceedings Cost

IT was voted to continue the present registration fee of $5 as heretofore, but this year to include without additional cost one copy of the Proceedings to each member or guest paying the fee for attendance at the meetings. Additional copies will be available to those registering and to members of the Association not attending the meetings at $2.50. To non-

members of the Association the price will be $5 per copy.

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Editing of Proceedings

IN this connection it was voted that, prior to the publication of the Proceedings, each member participating in the discussion should receive a transcript of his remarks to edit and return to the Chairman of the Publication Committee prior to the publication of the proceedings as a whole. In this way any participant in the discussions can be sure that he is

FREDERICK A. WESTPHAL
Superintendent of Wire Mills, Sheffield Steel Corp., Kansas City, Mo., Vice President, The Wire Association

properly quoted in the final printed Proceedings.

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Medal Award

IN view of the lack of formality existing at the dinners of the Association, it was decided that the Medal Award should be made at a general meeting of the Association on Wednesday morning of the Convention week, and that the awarding of the medal should be immediately followed by the presentation of the paper receiving the award.

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Entertainment

THERE was considerable discussion about the type of entertainment to be furnished; whether it would be in the nature of a dinner with the ladies present or a smoker, and the Board decided by a large majority to hold a smoker (stag). A committee to conduct this activity will be appointed later by the president.

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Regional Meetings

IT was decided that the Wire Association as an Association should not conduct regional meetings, but that groups of members might join together, form their own committees, arrange for their own speakers, and hold their own regional meetings with the consent and under the name of the Association. The Secretary of the Association was instructed to cooperate with any committees formed to conduct such activities. It was decided, however, that such meetings must be independent of any plant inspections or commercial activities, and of all outside enterprises. In other words, if a company decided to hold a plant inspection, the Wire Association could have nothing to do with this as an Association.

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Schedule of Meetings for Convention

THE tentative program for the Convention which will be held at Atlantic City, October 18th to 22nd, 1937, will be as follows:

Monday—Registration and get together, Directors luncheon, Meeting of Program Committee to correlate the week's work.

Tuesday—Presentation of technical papers.

Wednesday A. M.—Wire Association award. Presentation of Medal Award paper. P. M.—Technical papers.

Thursday A. M. and P. M.—Technical papers.

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IT is proposed to have simultaneous sessions on one day of the non-ferrous group and the steel and ferro-alloy group. Because of the increased activities of the Association, it has been felt necessary to increase the number of sessions and in order to do this within the three day technical session limit which is our practice, there will have to be individual sessions of these two divisions held on the same day.

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AT the 1937 meeting it is proposed to hold three meetings on steel and ferrous alloys, two meetings on non-ferrous metals and alloys, two meetings on cold heading and cold working of metals, and one general meeting.

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Election of Officers for 1937

IN submitting the nominations for officers, the Nominating Committee made the following report:

To the Board of Directors of the Wire Association:

It is the unanimous opinion of the nominating committee that it is to the best interest of the Association to have the president, if possible, serve two successive terms. We also feel that this applies to all other officers and we, therefore, recommend to the Board of Directors, the re-election of the present officers for the year 1937-1938:

To wit: Ralph K. Clifford, General Supt., Continental Steel Corp., Kokomo, Indiana—President.

F. A. Westphal, Supt. Wire Mills, Sheffield Steel Corp., Kansas City, Mo.—Vice President.

E. W. CLARK
Mechanical Engineer, Wire and Cable Section General Electric Co., Schenectady, N. Y., Vice President, The Wire Association.

E. W. Clark, Mechanical Eng., Wire & Cable Section, General Electric Co., Schenectady, N. Y.—Vice President.

Richard E. Brown, Publisher, "WIRE & WIRE PRODUCTS", New York, N. Y. —Secretary.

Respectfully submitted,
B. L. McCarthy
John Mordica
J. C. Callaghan
Nominating Committee."

✦ ✦ ✦

THE report of the Nominating Committee was accepted and the officers unanimously re-elected on one ballot cast by the Secretary.

✦ ✦ ✦

FOLLOWING the Director's Meeting, there was a luncheon with about 30 present at which short addresses were made by various officers of the Association and some very interesting "off the record" information was exchanged.

(*Please turn to page 216*)

Certified* Economy Precision

This record of an actual plant production test covers 14 consecutive days' operation of a Gas-Fired Cyclone, as compared with the performance of a competitive furnace doing the same class of work. Installed for drawing chain link side plates and pins, the Lindberg Cyclone Furnace reduced steel tempering costs 26.5 per cent. Figured on a yearly basis, this represents a return on the investment of 35.6 per cent—sufficient to liquidate the cost of the Cyclone Furnace in less than three years.

The precision for which the Cyclone is famous is illustrated by the report on a production run for government work over a period of several weeks: "A government inspector tested the pieces to be sure the Brinell hardness was between 388 and 415. The charges consisted of link bars either ½" or 1" thick and long enough to reach from the bottom to well toward the top of the baskets. **Over 2000 of these bars were tempered in the Cyclone without one rejection."**

Control charts and uniformity tests, pictured in the Report, show how such precision is possible.

As a result of the operating economy and accurate heating control obtained from the Cyclone, the remaining old furnace has been scrapped and a second similar Cyclone unit installed to take its place.

* Copy of this Report by an independent engineering company available on request.

Lindberg CYCLONE Tempering Furnace

Lindberg Engineering Co.

223 UNION PARK COURT — *Offices in Principal Cities Canada—Williams & Wilson Ltd.* — CHICAGO, ILLINOIS

SPRINGS AND WIRE PRODUCTS

Devoted to Products Made Wholly or in Part of Wire, Rod, Strip and Cold Drawn Steel.

J. W. Rockefeller, Jr., Section Editor.

Vol. 12 APRIL, 1937 No. 4

The Effect of Longitudinal Scratches Upon The Endurance Limit in Torsion of Spring Wire

PART II

By F. P. Zimmerli

Chief Engineer, Barnes-Gibson-Raymond, Inc., Detroit, Mich.

The following abstract includes only the bibliography referred to in the abstract and does not include the work of other investigators. This digest is published in two parts. + +

Discussion of Results

THE results obtained in this investigation are presented in the form of photomicrographs of scratches and endurance limits and will be found in the following pages. Each photomicrograph shows the cross section of the scratch, made by the tool indicated in the caption. Relative locations of copper and steel are indicated. The intended depth and the actual depth are indicated, as well as the endurance limit of the specimen. The percent decrease in endurance limit due to the presence of the scratch is also given. The purpose in presenting results in this form is to make it possible to make a ready comparison of the contour and depth of the scratch with the actual endurance limit obtained.

Abstract of a report by the Research Department of the Associated Spring Manufacturers compiled under the direction of the author. It is also desired to acknowledge the cooperative service rendered by the Barnes-Gibson-Raymond laboratories in connection with the necessary laboratory work done to tabulate the results secured.

FIGURE 6 is a photomicrograph of the surface of a polished torsional fatigue specimen. It will be noted that the scratches present are of a very small order of magnitude. Such scratches are circumferential and for this reason may be assumed to affect the endurance limit to a very small degree. From the standpoint of this work, the surface shown in Figure 6 may be considered to be ideal. The endurance limit of a test specimen having such a surface may be used as a standard of comparison for the endurance limits of test specimens having scratched surfaces. The endurance limit of test specimens with a surface like the one shown in the photomicrograph is 110,000 pounds per square inch. In all cases the endurance limit has been determined to the nearest 5,000 pounds per square inch. In this work the endurance limit is defined as that stress which will allow the sample to just withstand 10,000,000 oscillations. Any stress above this will cause failure before 10,000,000 stress cycles have been carried out.

+ + +

THE endurance limits of test specimens scratched with high speed steel tools are given in Figures 7 to 19, inclusive. It will be noted that most of these scratches have a rather large radius of curvature at the bottom of the scratch. The shape of the scratch does not vary greatly with the angle of the tool. The point of the 15° tool wore down faster than the others, and hence, the scratches produced by this tool did not lower the endurance limit greatly. The 30° tool produced the sharpest scratches. For scratches over 0.002 inch deep the 45° tool did not make as sharp scratches as the 30° tool.

+ + +

IN all cases it will be noted that the endurance limit does not decrease in a constant manner as the depth of the scratch increases.

Fig. 6. ✦ ✦ ✦ X1000
Polished Steel Specimen
Endurance Limit .....110,000 psi.

Figure 6
Surface of a polished torsional fatigue specimen.

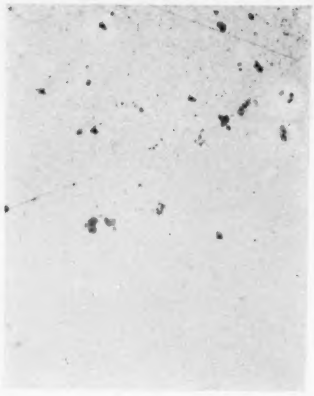


Fig. 7. ✦ ✦ X1000
15° High Speed Tool
Intended Depth .....0.0005″
Actual Depth .....0.00034″
Endurance Limit .....110,000 psi.
% Decrease in Endurance Limit 0.0

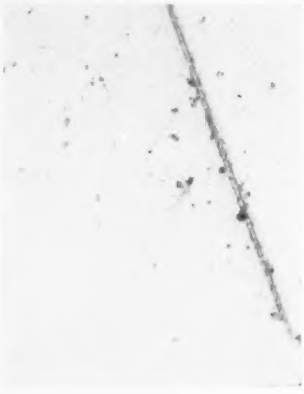


Fig. 8. ✦ ✦ X1000
15° High Speed Tool
Intended Depth .....0.001″
Actual Depth .....0.00056″
Endurance Limit .....105,000 psi.
% Decrease in Endurance Limit 4.5

Figures 7 to 19
The endurance limits of test specimens scratched with high speed steel tools.

Fig. 9. ✦ ✦ ✦ X500
15° High Speed Tool
Intended Depth .....0.002″
Actual Depth .....0.0013″
Endurance Limit .....105,000 psi.
% Decrease in Endurance Limit 4.5

Fig. 10. ✦ ✦ ✦ X250
15° High Speed Tool
Intended Depth .....0.005″
Actual Depth .....0.0033″
Endurance Limit .....100,000 psi.
% Decrease in Endurance Limit 9.0

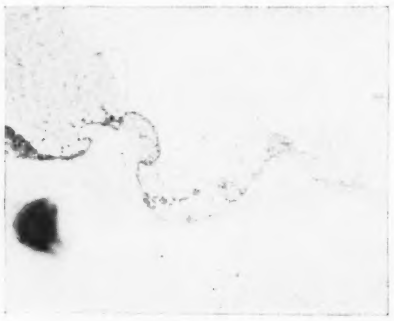
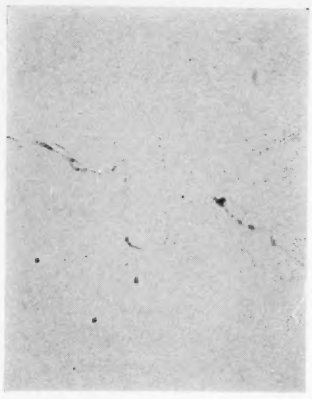


Fig. 11. ✦ ✦ ✦ X1000
30° High Speed Tool
Intended Depth .....0.0005″
Actual Depth .....0.00063″
Endurance Limit .....110,000 psi.
% Decrease in Endurance Limit 0.0

This is due to the fact that as the depth of the scratch is increased, the point of the tool wears down to a great extent and the sharpness of the scratch decreases. This is illustrated by several examples. In the case of the 30° tool the endurance limits for the 0.002 inch and the 0.005 inch scratches are the same. For the 45° tool the endurance limits for the 0.005 inch and 0.010 inch scratches are higher than that for the 0.002 inch scratch. In the case of the 15° tool the endurance limits for the 0.001 inch and 0.002 inch scratches are the same. It will be noted that scratches made by this tool lowered the endurance limit less than any of the other scratches investigated. All of the 0.0005 inch scratches made with high speed steel tools failed to lower the endurance limit appreciably.

✦ ✦ ✦

THE endurance limits of test specimens scratched with the



COPPER

STEEL

Fig. 12. ✦ ✦ X1000
30° High Speed Tool
Intended Depth .....0.001"
Actual Depth .....0.00071"
Endurance Limit .....100,000 psi.
% Decrease in Endurance Limit 9.0

Figures 7 to 19
The endurance limits of test specimens scratched with high speed steel tools.

COPPER

STEEL

Fig. 13. ✦ ✦ ✦ X500
30° High Speed Tool
Intended Depth .....0.002"
Actual Depth .....0.0015"
Endurance Limit .....90,000 psi.
% Decrease in Endurance Limit 18.1

COPPER

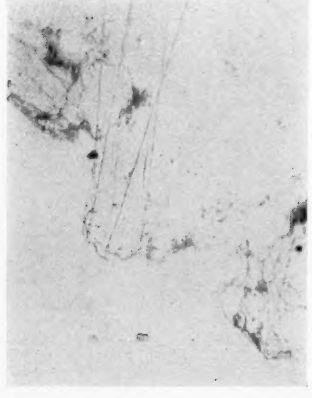
STEEL

Fig. 14. ✦ ✦ X250
30° High Speed Tool
Intended Depth .....0.005"
Actual Depth .....0.0042"
Endurance Limit .....90,000 psi.
% Decrease in Endurance Limit 18.1

COPPER

STEEL

Fig. 15. ✦ ✦ X1000
45° High Speed Tool
Intended Depth .....0.0005"
Actual Depth .....0.0005"
Endurance Limit .....110,000 psi.
% Decrease in Endurance Limit 0.0



COPPER

STEEL

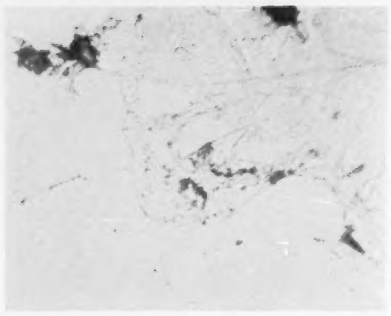
Fig.16. ✦ ✦ X1000
45° High Speed Tool
Intended Depth .....0.001"
Actual Depth .....0.00056"
Endurance Limit .....100,000 psi.
% Decrease in Endurance Limit 9.0

COPPER

STEEL

Fig. 17. ✦ ✦ ✦ X500
45° High Speed Tool
Intended Depth .....0.002"
Actual Depth .....0.0015"
Endurance Limit .....90,000 psi.
% Decrease in Endurance Limit 18.1

Stellite tool are given in Figures 20 to 23, inclusive. With the exception of the 0.0005 inch scratch, the results are somewhat similar to those obtained by use of high speed steel tools. For scratches over 0.001 inch deep the endurance limit is not decreased quite as much as is the case when high speed steel



COPPER

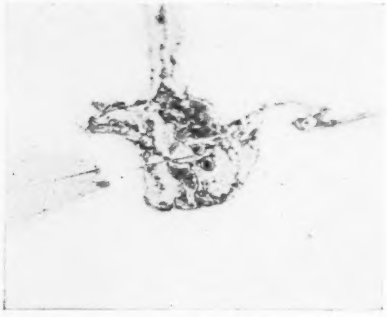
STEEL

Fig. 18. ✦ ✦ ✦ X500
45° High Speed Tool
Intended Depth .....0.005″
Actual Depth .....0.0019″
Endurance Limit .....105,000 psi.
% Decrease in Endurance Limit 4.5

COPPER

STEEL

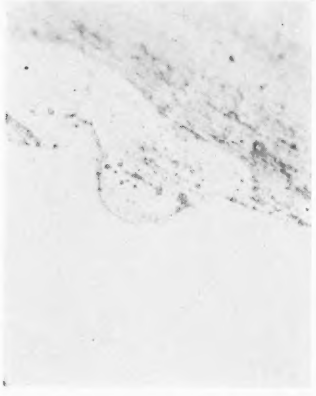
Fig. 19. ✦ ✦ X250
45° High Speed Tool
Intended Depth .....0.010″
Actual Depth .....0.0042″
Endurance Limit .....95,000 psi.
% Decrease in Endurance Limit 13.6



COPPER

STEEL

Fig. 20. ✦ ✦ ✦ X1000
30° Stellite Tool
Intended Depth .....0.0005″
Actual Depth .....0.00056″
Endurance Limit .....105,000 psi.
%Decrease in Endurance Limit 4.5

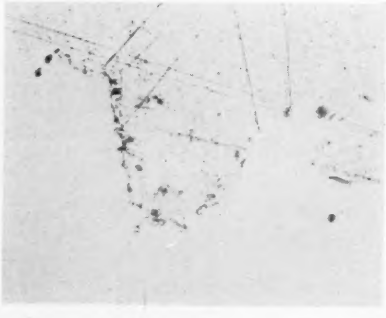


COPPER

STEEL

Fig. 21. ✦ ✦ X1000
30° Stellite Tool
Intended Depth .....0.001″
Actual Depth .....0.00063″
Endurance Limit .....100,000 psi.
% Decrease in Endurance Limit 9.0

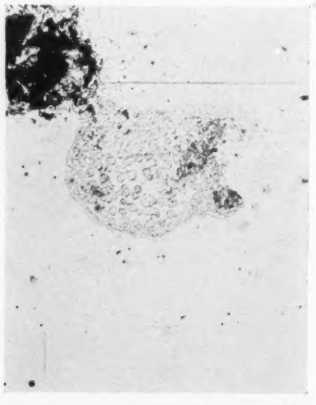
Figures 20 to 23
The endurance limits of test specimens scratched with Stellite tool.



COPPER

STEEL

Fig. 22. ✦ ✦ ✦ X1000
30° Stellite Tool
Intended Depth .....0.002″
Actual Depth .....0.0014″
Endurance Limit .....95,000 psi.
% Decrease in Endurance Limit 13.6



COPPER

STEEL

Fig. 23. ✦ ✦ X500
30° Stellite Tool
Intended Depth .....0.005″
Actual Depth .....0.0025″
Endurance Limit .....95,000 psi.
% Decrease in Endurance Limit 13.6

tools are used. This is probably due to the fact that the Stellite is more brittle than the high speed steel and the point crumbles away more rapidly in the deeper scratches. The 0.0005 inch scratch made with the Stellite tool decreased the endurance limit by 5,000 pounds per square inch. Apparently the

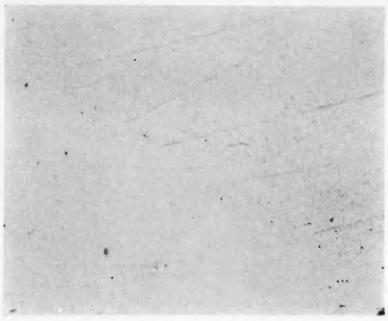


Fig. 24. ✦ ✦ ✦ X1000
30° Diamond Tool
Intended Depth .....0.00025″
Actual Depth .....0.00012″
Endurance Limit .....105,000 psi.
% Decrease in Endurance Limit 4.5

Figures 24 to 26
The endurance limits of test specimens scratched with diamond tool.

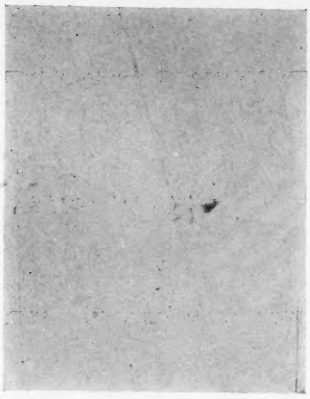


Fig. 25. ✦ ✦ X1000
30° Diamond Tool
Intended Depth .....0.0005″
Actual Depth .....0.00022″
Endurance Limit .....95,000 psi.
% Decrease in Endurance Limit 13.6

Fig. 26. ✦ ✦ ✦ X1000
30° Diamond Tool
Intended Depth .....0.001″
Actual Depth .....0.00039″
Endurance Limit .....95,000 psi.
% Decrease in Endurance Limit 13.6

Figures 27 to 31
Photomicrographs of a very poor quality spring wire which contains seams as well as scratches.

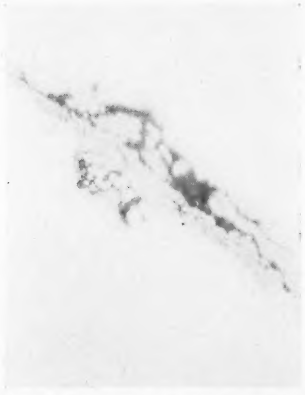


Fig. 27. ✦ ✦ X1000
Surface of Defective Wire
Depth of Defect .....0.00069″

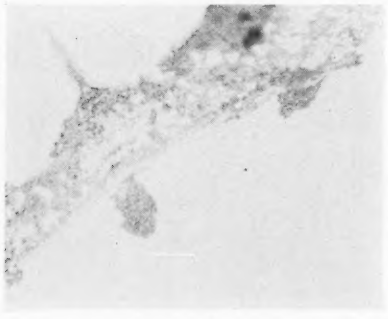


Fig. 28. ✦ ✦ ✦ X1000
Surface of Defective Wire
Depth of Defect .....0.00075″

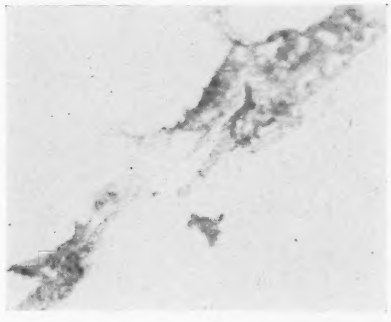


Fig. 29. ✦ ✦ ✦ X1000
Surface of Defective Wire
Depth of Defect .....0.00088″

greater hardness of Stellite leads to the formation of a sharper scratch at this depth.

✦ ✦ ✦

THE diamond tool scratches were apparently the sharpest of any of those investigated, since they decreased the endurance limit more than any other scratches of the same depth. They are shown in Figures 24 to 26 inclusive. A scratch 0.0005 inch deep lowered the endurance limit to 95,000 pounds per square inch. Unfortunately this depth was about the maximum that could be reached with the diamond tool without seriously damaging the point. This is apparent from the fact that the endurance limit of the 0.001 inch scratch is no lower than that for the 0.0005 inch scratch.

✦ ✦ ✦

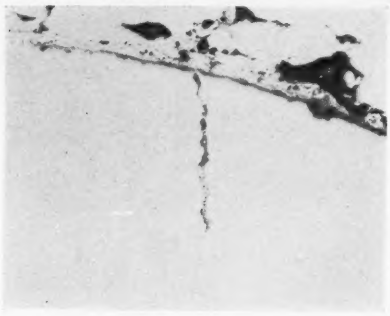
THE lowest endurance limit determined on scratched specimens was that of the specimens scratched with the 30° high speed steel tool to a depth of 0.005 inch.

(*Please turn to page 191*)

COPPER

STEEL

Fig. 30. ✦ ✦ X1000
Surface of Defective Wire
Depth of Defect .....0.003″

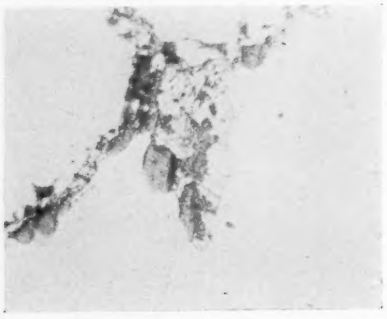


COPPER

STEEL

Fig. 31. ✦ ✦ ✦ X250
Surface of Defective Wire
Depth of Defect .....0.008″

COPPER



STEEL

Fig. 32. ✦ ✦ ✦ X500
Surface of Etched Defective Wire
Depth of Defect .....0.0032″

STEEL

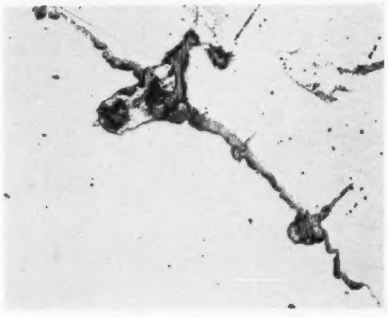


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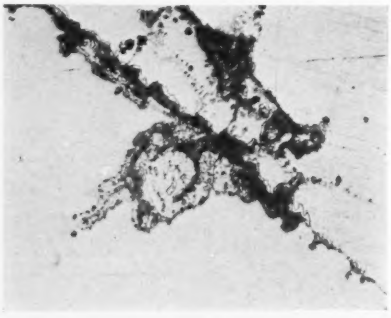
Fig. 33. ✦ ✦ ✦ X250
Surface of Etched Defective Wire
Depth of Defect .....0.0043″

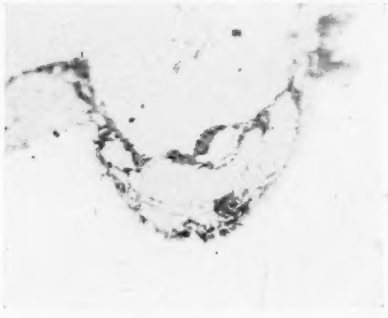


COPPER

STEEL

Fig. 34. ✦ ✦ ✦ X500
Surface of Etched Defective Wire
Depth of Defect .....0.004″

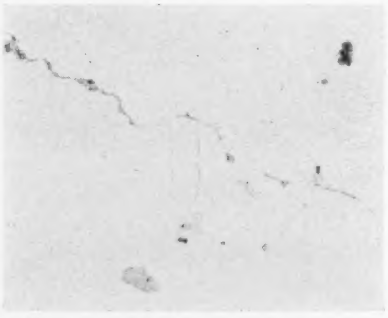
Figures 32 to 35
Surface of the defective spring wire after it had been acid etched.



COPPER

STEEL

Fig. 35. ✦ ✦ ✦ X1000
Surface of Etched Defective Wire
Depth of Defect .....0.0018″



COPPER

STEEL

Fig. 36. ✦ ✦ ✦ X1000
Surface of Etched Wire

Figure 36
Effect of acid etching upon surface of the spring wire.

Figure 37
Surface of spring wire before acid etching.

COPPER

STEEL

Fig. 37. ✦ ✦ ✦ X1000
Surface of Commercial Spring Wire

TABLE I

TORSIONAL STRESSES PRODUCED BY ISOLATED SCRATCHES IN ROUND SHAFTS

d=depth of groove p=radius of curvature at bottom of groove	Ratio of Maximum Stress at Bottom of Groove to the Surface Stress in an Unscratched Shaft				
	Values of d/p				
Angle of groove in degrees	½	1	3	5	9
0	1.85	2.01	2.66	3.23	4.54
60	1.84	2.00	2.54	3.06	3.99
90	1.81	1.95	2.40	2.64	3.12
120	1.66	1.75	1.95	2.06	2.13

This endurance limit was 90,000 pounds per square inch. The actual depth of the scratch was 0.0042 inch. The smallest radius of curvature at the bottom of the scratch was approxixmately 0.0014 inch. The ratio of the depth to radius of curvature is exactly 3. According to the work of Griffith as given in Table I, the factor by which the stress in the outer fiber should be multiplied to get the stress concentration at the bottom of the scratch is between 2.54 and 2.66. If the average of these two factors, namely 2.60, is used, the stress concentration produced by the scratch would be 234,000 pounds per square inch. This is quite plainly a ridiculous figure, since it is much above the ultimate strength of the steel, 148,000 pounds per square inch. It appears, therefore, that no practical information can be obtained regarding the stress concentration in scratched wires by the use of Table I.

✦ ✦ ✦

AS mentioned above, the lowest endurance limit obtained on a scratched test specimen was 90,000 pounds per square inch. The endurance limit of a polished test specimen was 110,000 pounds per square inch. Fatigue tests on helical springs made by Mr. F. P. Zimmerli determined that the endurance limit of the wire was about 70,000 pounds per square inch. Figures 27 to 31, inclusive are photomicrographs of a very poor quality spring wire which contains seams as well as scratches. It will be noted that none of the scratches were as sharp or as deep as some of those used upon test specimens in this investigation. It would appear, then, that the lower endurance limit of wire tested in the form of springs is not due entirely to the presence of surface scratches.

✦ ✦ ✦

PHOTOMICROGRAPHS were made of the surface of the defective spring wire after it had been acid etched. These are shown in Figures 32 to 35, inclusive. A comparison of these photomicrographs with those taken before acid etching shows that the etch exaggerates or emphasizes the scratches. It also tends to roughen the surface of the wire due to a preferential attack of the steel by the etching reagent in some places. Figure 36 shows the effect of acid etching upon the surface of the wire. The surface before acid etching is shown in Figure 37.

✦ ✦ ✦

Suggestions for Correlated Investigations

IT is evident that in the present investigation only the surface of the problem has been scratched, in more senses than one. The endurance limits of polished spring wire test specimens have been shown to be considerably higher than those of wire specimens which have not been machined or polished. It also has been shown that scratches made upon polished test specimens lower the endurance limit in repeated torsion appreciably. The decrease in endurance limit produced by the presence of scratches, however, did not fully account for the difference in endurance limits of polished specimens and commercial wire in the shape of helical springs. Some English investigators suggest that this discrepancy is due to surface decarburization and oxidation. It appears, therefore, that an investigation of this condition might be worth while. Such conditions could be largely controlled in the processing of the wire during manufacture.

✦ ✦ ✦

SINCE it has been shown in this investigation that scratches of .001 inch or more cause a decrease in the endurance limit of a polished sample with a reduced section, it would seem that similar tests upon full-sized sections would be very much in order. By this means, it would be possible to study not only scratches, but seams and other types of surface defects occurring in commercial wire.

✦ ✦ ✦

News and Notes of the Spring Industry

Spring Committee of A.S.M.E. About to Launch a New Program of Research

FIVE years ago the Spring Research committee of the American Society of Mechanical Engineers sent out a questionnaire to firms engaged in the manufacture of springs and products in which springs are used. This questionnaire was designed to indicate what research problems would be of the greatest interest to concerns in this field. As a result of the returned questionnaires, a spring research program was formulated. Some of the problems included in this program of research were the following:

1. **The relation of fatigue strength to static strength of springs and spring materials.**
2. **Investigation and correction of existing formulas for ascertaining stress and reflection of helical springs.**
3. **End coil effect in helical compression springs.**
4. **Compilation of a spring bibliography containing references to the most important spring literature published to date.**

(*Please turn to page 210*)

Outstanding Personalities of the Wire Industry

Keystone Steel and Wire Company Appoints J. A. Moritz Superintendent of Wire Mills

MR. J. A. Moritz started working at the Keystone Steel & Wire Company in 1912 and remained there until 1928, during which time he was foreman of several different departments and also night superintendent.

✦ ✦ ✦

IN 1928 he was transferred to Mid-States Steel & Wire Company at Crawfordsville, Indiana, a subsidiary of Keystone, also having branch plants at Anderson, Indiana, and Adrian, Michigan, as superintendent.

✦ ✦ ✦

IN 1932 he was made a director of the Mid-States Steel and Wire Co., and in 1934 was made vice-president in charge of operations. In December, 1936 Mr. Moritz was transferred to Keystone Steel & Wire Co., at Peoria, Illinois, as superintendent of wire mills, continuing to hold his position as Vice President in Charge of Operations with Mid-States. At the present time he spends a few days each month at Mid-States, putting the bulk of his time in the work required as superintendent of wire mills at Keystone.

✦ ✦ ✦

MR. Moritz has the reputation of being extraordinarily fair in his handling and dealings with labor and it is of interest to note that for over twenty years in his contacts and dealings with labor, he has never once violated or impaired this standing and today retains the confidence of the men working under him to a marked degree.

✦ ✦ ✦

WHILE with Mid-States, Mr. Moritz was instrumental to a large extent in improving the quality of wire with the box and basket industry.

✦ ✦ ✦

BEST wishes are extended by the members of the Wire Association for his continued success in his new connection.

J. A. MORITZ
Superintendent of Wire Mills, Keystone Steel & Wire Company.

Hoover Made Manager of Goodrich Chemical Aids

J. R. HOOVER, who for the past six years has served as assistant manager of chemical sales for the Mechanical Rubber Goods Division of The B. F. Goodrich Company, has recently been made manager of this department.

✦ ✦ ✦

HOOVER takes over the duties of Dr. H. E. Fritz who will in the future devote his entire efforts to the sale and development of Koroseal, the new synthetic elastic material recently introduced by Goodrich.

✦ ✦ ✦

Pierce T. Wetter, Vice President, American Cutting Alloys, Inc.

PIERCE T. Wetter, who for ten years has been on the Staff of the American Society of Mechanical Engineers supervising its technical professional division, has left the Staff of the Society to become executive Vice-President of the American Cutting Alloys, Inc., of 500 Fifth Avenue, New York City.

✦ ✦ ✦

MR. WETTER was responsible for the development in the American Society of Mechanical Engineers of their specialized national technical meetings of which almost one hundred have been held under his supervision. This program of the American Society of Mechanical Engineers was inaugurated ten years ago to satisfy the needs of the specialists within the larger Society.

✦ ✦ ✦

IN his new position Mr. Wetter will have charge of developing the American Cutting Alloys, Inc., in the manufacture and sale of cemented carbide titanium tips and cuttings tools particularly for the cutting of steel at high speeds. The Company plans to enlarge its program of activities which have been gradually developed during the last eighteen months. Mr. Wetter also becomes Vice-President and Assistant Treasurer of the American Electro Metal Corporation of Lewiston, Maine, manufacturers of molybdenum and tungsten products.

✦ ✦ ✦

WIRE ASSOCIATION

New Members From February 1 to March 15.

BASSETT, WM. H., JR., Manager,
Metallurgical Development,
Anaconda Wire and Cable Co.,
Hastings-on-Hudson, N. Y.

BEACH, HAROLD K., Engineer,
Phelps Dodge Copper Products Corp.,
American Copper Products Div.,
Elizabeth, N. J.

BRYANT, F. H., Secretary,
Western Automatic Machine Screw Co.,
Elyria, Ohio.

BUTLER, J. F., Supt.,
Milton Mfg. Co.,
Milton, Pa.

FOSS, DR. ING. FEODORE F., Asst. to Chairman & General Metallurgist,
Wheeling Steel Corporation,
Wheeling, West Virginia.

KRISE, R. W., V. P. & Gen. Mgr.,
Milton Mfg. Co.,
Milton, Pa.

LONGNECKER, HARRY F., Sales Rep.,
Firth Sterling Steel Co.,
McKeesport, Pa.

MANN, JOSEPH G., Treasurer,
Consolidated Wire & Associated Corps.,
Chicago, Illinois.

PURTELL, WILLIAM A., President,
Holo Krome Screw Corp.,
Hartford, Conn.

SCHWAB, W. H., Vice President,
General Rivet Company,
Cleveland, Ohio.

SKADE, EDWARD M., Foreman,
High-Carbon Wire Drawing Mill,
Nachman Spring-Filled Corp.,
Chicago, Illinois.

SLIFKA, M., Purchasing Agent,
Parker-Kalon Corp.,
New York City.

STAPLES, HORACE A., V. P. Chg. Mfg.,
Phelps Dodge Copper Products Corp.,
New York City.

VAUGHAN, CURTIS H., Sales Engr.,
The Electric Furnace Co.,
Salem, Ohio.

WOOD, MAURICE L., Metallurgist,
Chase Brass & Copper Co., Inc.,
Waterbury, Conn.

ANNOUNCING ✣ ✣

The Organization of a New Division of the Wire Association Devoted to

COLD WORKING OF METALS FINISHED PRODUCTS

B. L. McCARTHY, Metallurgist,
Wickwire Spencer Steel Co., Buffalo, N. Y.
Chairman of Division

A. R. ZAPP,
Firth Sterling Steel Co.
Chairman
Organization and Membership Committee

✦ ✦ ✦

PURPOSES:

The specific purposes are to promote the art of cold working, together with the application of metallurgical and scientific studies to these and related problems and to improve the manufacturing processes of cold working, cold heading, deep drawing, sintered grinding, extruding, etc.

✦ ✦ ✦

FUNCTIONS:

THE division functions along the following lines:

1. The use of the Association headquarters as a central clearing house for information and data of all kinds which may be of interest to members.
2. The exchange of ideas on processes of production including machinery, technical processes, etc.
3. The establishment and maintenance of friendly relations among the members of the association and the development of sectional and national meetings to discuss matters of mutual interest.
4. Studies of production methods and analysis of production costs.
5. Developments in the use of new materials and new applications of existing materials and by-products.
6. Research and collection of information on personnel management, including such factors as labor turnover, seasonal changes in the demand for employees, wage scales, etc.
7. Standardization and simplification as a means for the effective elimination of waste.
8. Such other subjects as may be determined upon.

✦ ✦ ✦

ACTIVITIES:

DURING the year the following activities will be in operation:

1. Each month there will be published in WIRE AND WIRE PRODUCTS, the designated "Official Publication" of The Wire Association, at least one article or research paper relating to the cold working of metals or the fabrication of cold headed or cold finished products made from cold drawn bars, rods or wire. These papers will be contributed by writers fully conversant with the subjects presented.
2. The Wire Association information service—A cooperative confidential service through which members exchange ideas and endeavor to aid each other in process and production problems. No identities are revealed without specific authorization. Questions and answers are given a number and all data transmitted under the allocated number.
3. The annual Wire Association technical meetings held annually in association with the National Metal Congress. At this convention each division of The Wire Association holds three sessions on non-conflicting dates as follows: 1. Metallurgy and Research. 2. Processes and Machinery of Production. 3. Cold Working and Cold Finished Products.

✦ ✦ ✦

THE ANNUAL DUES ARE $10.00

In addition to the activities set forth, the membership also includes:

1. A subscription for the period of the membership to the designated official publication of the Association, "WIRE AND WIRE PRODUCTS".
2. A copy of the annual WIRE BUYERS GUIDE AND YEAR BOOK OF THE WIRE ASSOCIATION.
3. Proceedings.

This is an Invitation For You to Join The Wire Association and Participate in the Activities of Your Division.

Simply Fill Out the Membership Form Shown and Mail it to

Richard E. Brown, Secretary,
The Wire Association
17 E. 42nd St., New York, N. Y.

THE WIRE ASSOCIATION
17 EAST 42ND STREET, NEW YORK, N. Y.

The undersigned hereby applies for membership in the Wire Association, and agrees to be governed by the Charter and By-Laws of the Society and to further its objects as laid down therein.

Name .....

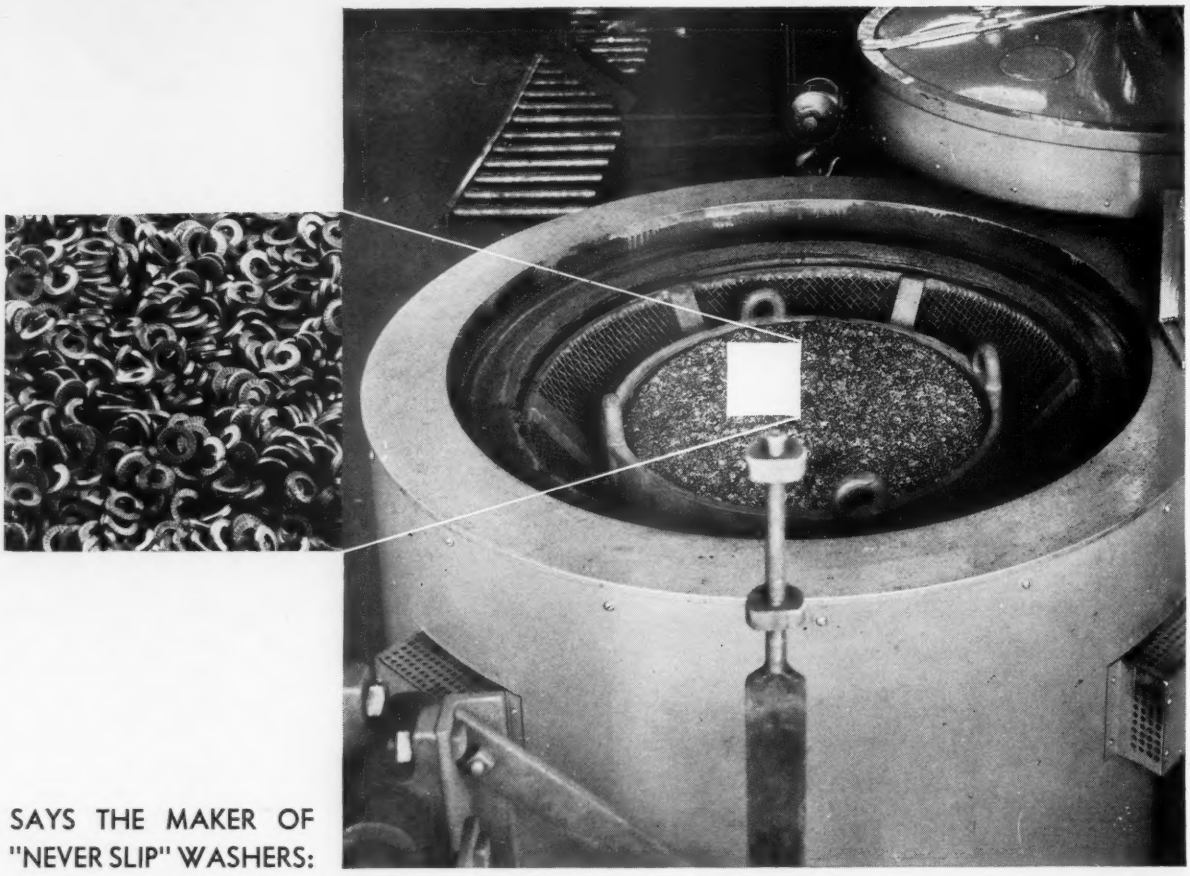
Address .....

Applicant's Title or Occupation .....

Name of Organization .....

Address of Organization .....

Nature of Business .....



SAYS THE MAKER OF
"NEVER SLIP" WASHERS:

FOR BEST TEMPERING, GIVE US HOMO

Today the Philadelphia Steel & Wire Corporation tempers lock-washers to higher uniformity than ever before—and tempers at lower cost. They give credit to their new high-production, low-maintenance Homo Furnaces.

Uniformity of "physicals" is far inside the S.A.E. specs., even in the tiny sizes, which form extremely dense loads in the furnace. This uniformity is secured automatically, without relying on a skilled furnace operator. Homo forced-convection gives even heating under completely automatic control, and records all temperature facts about each heat. Cost is low; the Homo draws a tremendous volume—half a ton of washers to spring temper in forty minutes or less. Maintenance is low; this furnace has new-design heater, alloy top casting and guide rails.

If your product has small or medium-size parts that can profit by uniform, low-cost tempering, investigate the new Homo—It gives distinctly superior results.

Size of parts and density of load has very little effect on Homo capacity to temper uniformly and speedily. Washers ranging from ⅛" to 1½" in diameter go to the Philadelphia Steel & Wire Corporation's Homo equipment, and if still smaller or even larger sizes should be ordered, they would receive the same uniform Homo temper.

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MEASURING INSTRUMENTS • TELEMETERS
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COLD WORKING OF METALS FINISHED PRODUCTS

Cold Worked Metals + + + Cold Formed or Machined Products + + + Cold Heading

1. Metallurgy and Research
2. Processes and Machinery of Production
3. Cold Heading
4. Cold Forming and Finishing Operations
5. Extruding

Vol. 12 APRIL, 1937 No. 4

Cold Processing Alloy Steels

By Richard Saxton

Sheffield, England

A description of the cold working of alloy and stainless steels outlining British practice for preparing the steels for working, working the steels, with special reference to heat treating. + + + + +

COLD working of alloy steels by drawing, a method of fabrication in which the material is cold worked plastically by application of pressure, entails in addition to knowledge of flow in crystalline structures a wide experience of the various temperatures essential to heat treat efficiently these steels. Not all alloys are amenable to cold deformation, even in the annealed state, and where possible to reduce a wide variation exists in depth of reduction possible, due in majority of compositions to varying resistance to cold pressure of the many constituents.

+ + +

THOUGH the number of elements added to steel to form what is known as alloy qualities is relatively small, approximately only six finding extensive application, it is the wide range of carbon content together with the many possible combinations of alloying elements which furnish the numerous compositions at present employed for specific purposes. Hardness effect or intensity of hardness quality is dependant chiefly on carbon content, and minus this element the property of hardening by quenching or cooling is small, but the ease with which hardness may be imparted is in general due to elements other than carbon.

Qualities Amenable to Cold Work

CHIEF qualities amenable to cold work as in reduction by drawing are Nickel-Steels; Nickel-Chrome; High-Carbon Chrome; Silico-Manganese; High Speed; Tungsten; Chrome-Vanadium and Chrome-Silicon. Due to defects produced by previous hot working it is essential that all material be inspected prior to cold processing, when defects such as slivers, faulty rolling, etc., should be detectable.

+ + +

Detecting Flaws and Defects

WHERE the surface is found to be rough and there is reason to suspect faults undetectable visibly, the material should be immersed in a 10% sulphuric solution for approximately one hour, then allowed to dry in air without washing or immersion in water. When dry the surface defects in the form of fine slivers, pits, etc., are revealed by the formation of corrosion around the defective part. Where defects in the form of slivers are found to travel from the end for a length of about 24 inches this is an indication that the defect may exist throughout entire bar or coil, a condition detrimental to further processing.

+ + +

Grain Structure

IN the reduction of alloy steels the essential property is a uniform flow of grain structure under the pressure imposed. Minus this property a condition of severe cross-sectional stress is imparted, leading to weakening of the cohesion of crystalline structure and its ultimate fracture. All qualities, to reduce efficiently, must be in the austenitic condition, and though the majority gradually change to martensitic with the elongation of the grain formation, this condition can usually be eliminated by suitable heat treatment.

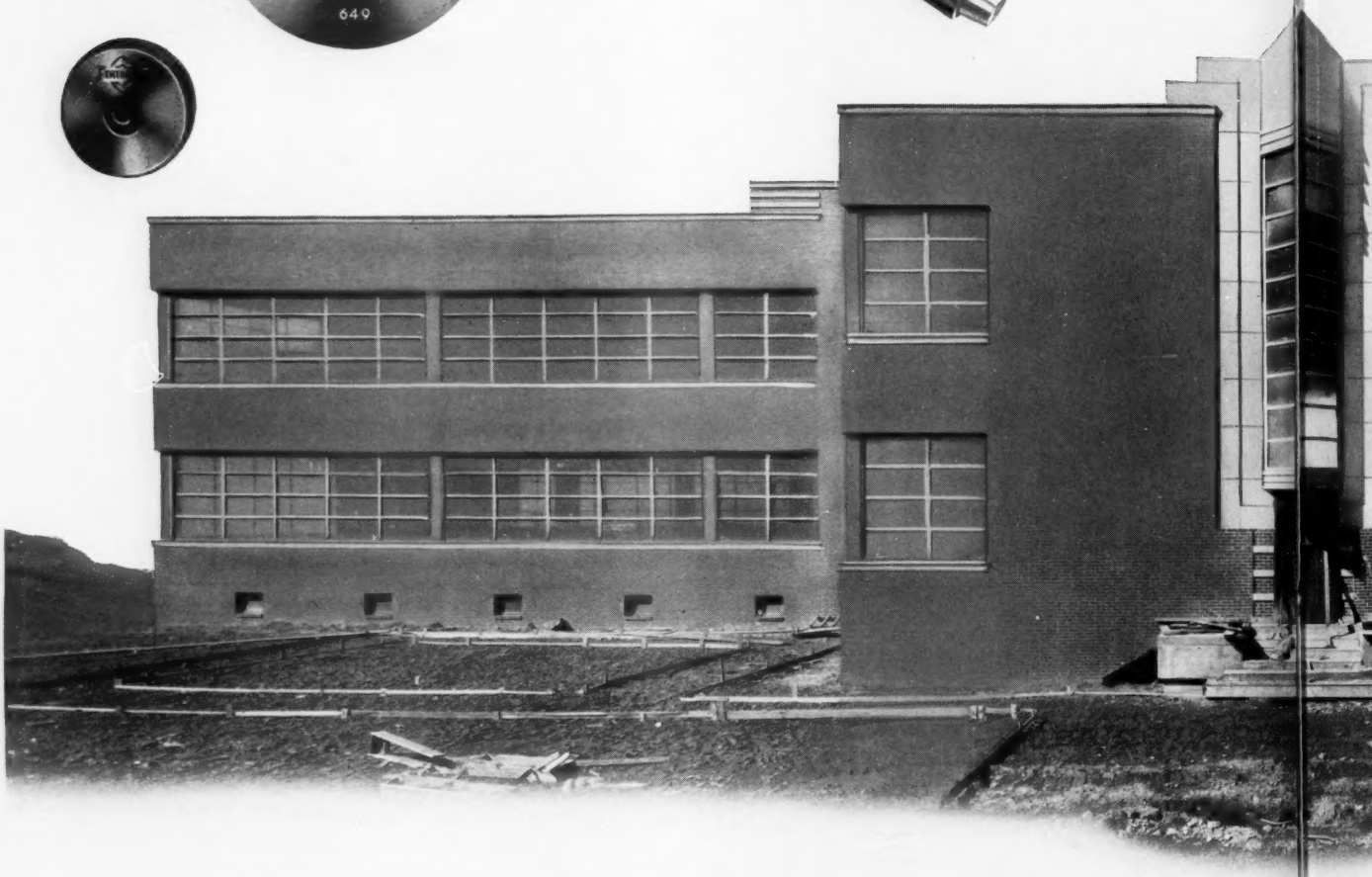
+ + +

Flow Under Cold Working

FLOW of structure under cold pressure is of two kinds; the first being the slip on the crystal cleavage planes and the second the slip between crystals. In the reduction of cylindrical formations, in which material is confined on all sides, pressure converges on the centre and the structure at this point undergoes its severest elongation. Where the pressure is irregular as in too small or ineffi-

NEARING OM

OPENING MAY



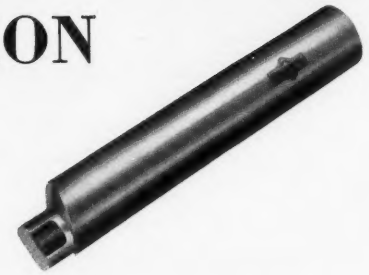
The completed plant, in operation, will be open for inspection after May 21st. Our customers and friends who are users of dies are cordially invited to visit all departments and see the process from raw material to finished product.

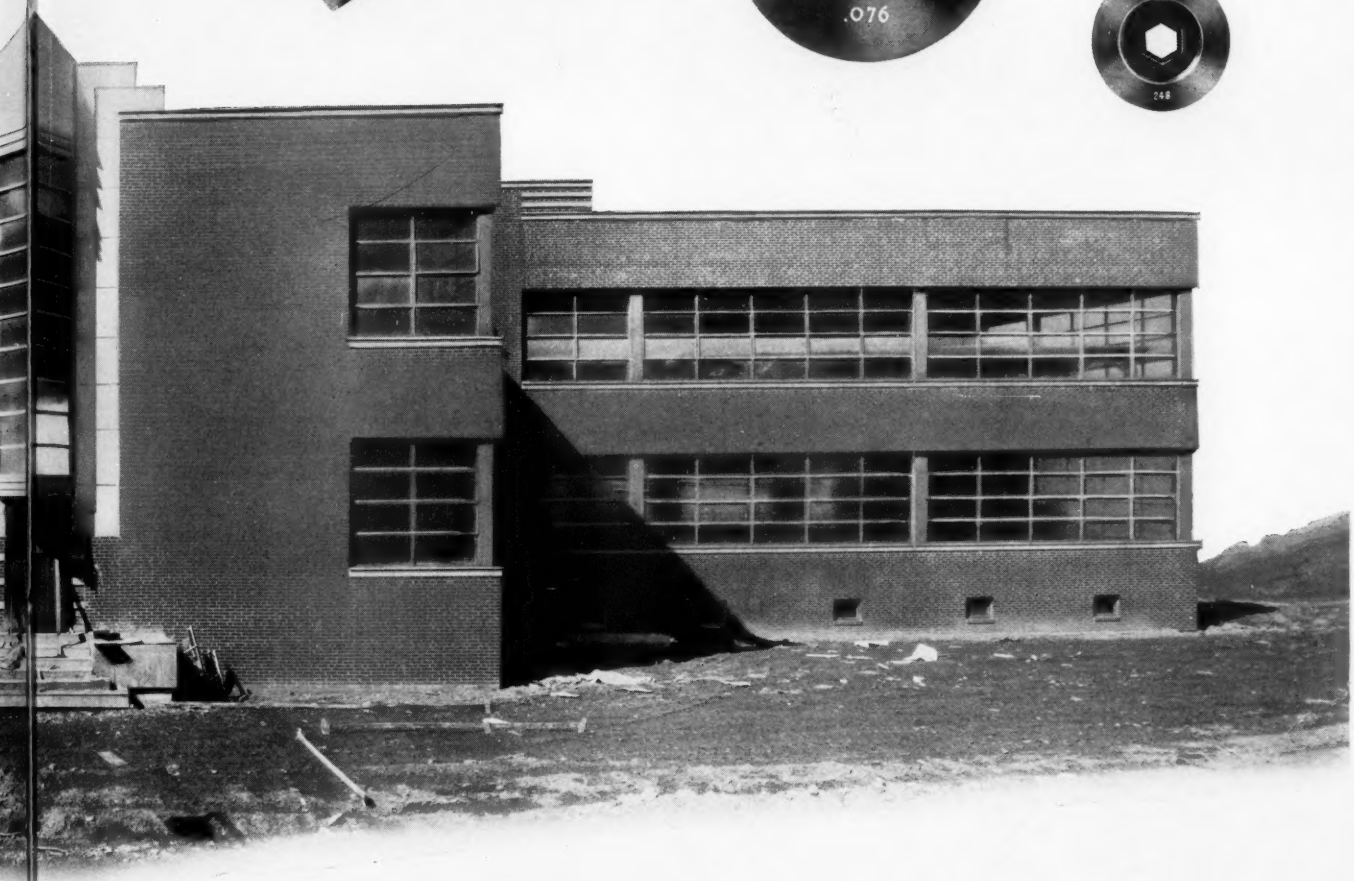
FIRTH-STERLING FIRTHALOY QUALITY

FIRTH-STERLING STEEL COMPANY

OMPLETION

G MAY 21ST





Construction is practically completed and machinery is now being installed in this new Carbide Building, which we believe is the largest devoted exclusively to the manufacture of Sintered Carbides in the United States. When complete, all departments will be integrated and capacity greatly increased.

LIG
AY

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NEW YORK CHICAGO HARTFORD
CLEVELAND DETROIT LOS ANGELES
PHILADELPHIA DAYTON
GLOBE WIRE DIVISION, McKEESPORT, PA.

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FIRTHALOY
QUALITY

ciently shaped orifice to reducing zone, uneven forces result in irregular hardening and weakening of the structure cohesion. The latter condition if not extreme can be eliminated by prolonged soaking treatment during annealing.

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Reduction and Dies

PERCENTAGE of reduction possible per draft is dependent on the composition and reaction to cold work. Mild or malleable nature in the normalised or annealed condition is no indicator of flow, and in general compositions containing 0.12 to 0.20% carbon are found to furnish the highest aggregate reduction, though the percentage per draft may be small.

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THE introduction of the tungsten-carbide type of die with its high resistance to wear under heat generated marked a notable increase in efficiency of reduction units. The inability to re-set to original size when worn was at first considered to be an insuperable barrier to general adoption, but high production increase and further knowledge of capabilities quickly proved it to be a more economic factor than the malleable carbon steel type.

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HIGH wear-resisting properties of these dies led to further research re most efficient drawing angles, and though much valuable data was obtained on the subject there still exists between recognised authorities a difference of opinion as to what constitutes the ideal reducing angle. Two standards having a wide following are shown in Table A.

TABLE A

	No. 1	No. 2
Aluminum & Silver	Angle of 14 to 15 degrees.	Angle of 16 to 18 degrees.
Copper	Angle of 12 to 13 degrees.	Angle of 14 to 16 degrees
Brass & Bronze	Angle of 9 to 10 degrees.	Angle of 10 to 12 degrees
Iron & Steel	Angle of 6 to 8 degrees.	Angle of 8 to 11 degrees
High Speed Steels	Angle of 5 to 6 degrees.	Angle of 5 to 6 degrees

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Heat Treating of Alloy Steels

AS previously stated a wide knowledge of the various temperatures necessary to successfully heat treat is essential, for unlike ordinary carbon steels, carbides other than iron must be considered. Theoretically the application of heat is to effect a physical change in the structure, and as the majority of carbides are of a stubborn character from the view point of solubility, they resist absorption in varying degrees, thus necessitating a knowledge of time as well as temperature control.

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HEAT resisting properties of alloy steels are probably their most outstanding feature, and are due in great majority to the complex nature imparted by the addition of the various alloying elements, which in general include at least one element retarding grain growth. Tungsten may be cited as an example, this diffusing slowly even at high temperatures, though present in greatest quantity in compositions such as high speed steels, etc.

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WHILST the superiority of electrical heat application, automatic temperature control and bright annealing is indisputable, heat treatment as here defined refers to gas and coal-fired furnaces. Full annealing for cold working is not absolutely essential and normalising, with the majority of compositions, can be employed to furnish a condition producing uniform flow. Thorough soaking at 700/800 degrees C. with a majority of compositions will produce a condition rendering them amenable to cold work.

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DUE to sluggishness of carbides in heat absorption and low thermal conductivity of some alloys, the rise in temperature should be as slow as possible consistent with economical production, and where impracticable to allow it to rise with the furnace from the cold state the material should first be well aired and then charged into the furnace at a temperature not exceeding 500 degrees C. On attaining normalising temperature the material should be soaked for approximately 40 minutes per inch of diameter.

RAPID heat application or forced firing are extremely detrimental to alloy qualities, leading to a condition of molecular segregation developing into cracks on subjecting to cold pressure, and many defects stated to be due to inefficient hot processing are undoubtedly due to forced heat application during normalising or annealing.

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Defects in Processed Alloy Steels

AS cracking or splitting defects found in alloy steels in subsequent processing to cold pressure working are usually assumed to be due to this process, a description of stress imparted and effect of method of liberating are here given. With practically all cold worked alloy steels employed in engineering there is a condition of internal stress, induced by process of fabrication or by rapid cooling during thermal treatment prior to tempering. Internal or differential stress is set up by the movement of crystalline formation during cold working or drawing, and may be released by heat treatment or machining.

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Distortion

IN machining without prior heat treatment distortion frequently occurs through released stresses adjusting themselves to a state of equilibrium on removal of surface structure. Additional to this is the fact that the heavier the cut the greater is the stress created in surface metal, and the tougher the steel the greater the degree of stress induced in the machined surface. In hardening and tempering, instructions re specified hardening temperature should be strictly followed, as it is useless, heating to say 700 degrees C., when the hardening temperature is given as

850 degrees C.; carbides in the majority of alloys in this class rarely commence to go into solution until steel has attained a temperature of 800 degrees C.

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Splitting or Cracking of Metal

A FURTHER defect ascribed to cold pressure work is splitting or cracking of metal after hardening. The true cause of this trouble is the delay in tempering. Alloy steels as hardened are in a condition of severe stress and the colder the metal the more severe the stress, the only known preventitive being to temper immediately the quenching is finished.

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Brittleness

IN reference to temper brittleness, a not uncommon condition of cold worked alloys in the hardened and tempered state, it may be stated that conditions leading to this defect have never as yet been explained. Many theories have been advanced as to the changes inducing this condition, the most feasible of which is that slow cooling after tempering induces carbides to diffuse or migrate to grain boundaries, the film of austenite thus created imparting brittleness to the structure. Objection to this is that no explanation is furnished as to the nonformation of film when heating to tempering temperature, this only being noticeable on slow cooling.

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Stainless Steels

PROBABLY the most widely known qualities, apart from the high speed group, are the stainless alloys which, apart from corrosion resisting properties, possess with certain compositions, characteristics extremely serviceable in engineering; high chrome qualities with carbon exceeding 0.25% being highly heat resisting and unaffected by temperatures disintegrating ordinary carbon steels. An outstanding feature of these alloys is the almost entire absence of harmful oxidation, a factor of service when heat treatment has to be carried out in the open furnace.

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STAINLESS steels may be classed in two groups; the first being those susceptible to hardening by heat treatment and the second non-responsive. The first is usually described as "martensitic", due to martensitic structure imparted when quenched from a suitable temperature. The second group—minus the property of hardening by thermal treatment—hardens rapidly during cold working, and are described as austenitic steels. Alloys in the second series respond best to cold pressure and are also the more highly resistant to general corrosion.

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Heat Treatment of Stainless Steels

HEAT treatment procedure varies with different compositions and purposes, for apart from variation in temperature essential to ensure carbides passing into solution, methods of cooling vary; the high chrome, carbon in excess of 0.25%, hardening in air, while the 18.8 qualities with carbon below 0.20% require quick chilling to fully anneal. Cold work reduction of the austenitic group presents few difficulties once the commencing drafts have been passed, but difficulties are often experienced in "roughing" due to irregular shape of rod.

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DUE to differential stresses introduced by prior operations and coarseness of grain structure, heat application previous to cold working is essential, and this is conducted with the 18.8 series by raising to a temperature of 1020 degrees C. in a non-scaling atmosphere and quenching in water. Intermediate treatments between draftings are conducted at 940/960 degrees C., an austenitic structure being possible between these temperatures if the reduction has not been carried to extremes. A further factor is that the lower the temperature the less the risk of surface pitting.

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Dies for Drawing Stainless Steels

CLASS of die unit employed for reducing stainless qualities varies, but in general carbon steel qualities are employed in first drafting and from .202″ to 0.022″ tungsten carbide. Reduction with the tungsten-carbide die can be carried to .004″, but beyond this diameter is not a commercial proposition, and general practice is to reduce from .022″ to .0004″ by diamond.

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Acid Cleaning

ACID cleaning in relation to surface preparation for cold processing while not the ideal method, still remains the most economical and practical. Alloy steels in rod form requiring heat treatment previous to acid immersion should be annealed in a slightly oxidising atmosphere, which loosens the small scale and renders it easy to remove. Stainless steels in rod form present no difficulty in acid cleaning if given an acid dip previous to heat treatment, this acting as a preventitive to the tendency of scale to bake on the underlying metal.

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Alternative Preparation for Working Stainless Steels

AN improved method of preparation for cold working stainless steels and one furnishing a slightly higher output than acid process with dies .128 and smaller, is to pass the scaled material on cooling through a scale polisher, which removes oxides and imparts a bright smooth surface favourable to drawing and subsequent polishing. One pass through the de-scaler is usually sufficient and the material should then be dipped in water to wash off the fine scale adhering, then limed in the usual way for dry drawing or kept damp for wet process. Stainless alloys worked in this way require little polishing; one operation with flour emery followed by chromic oxide only being necessary to impart a mirror-like surface.

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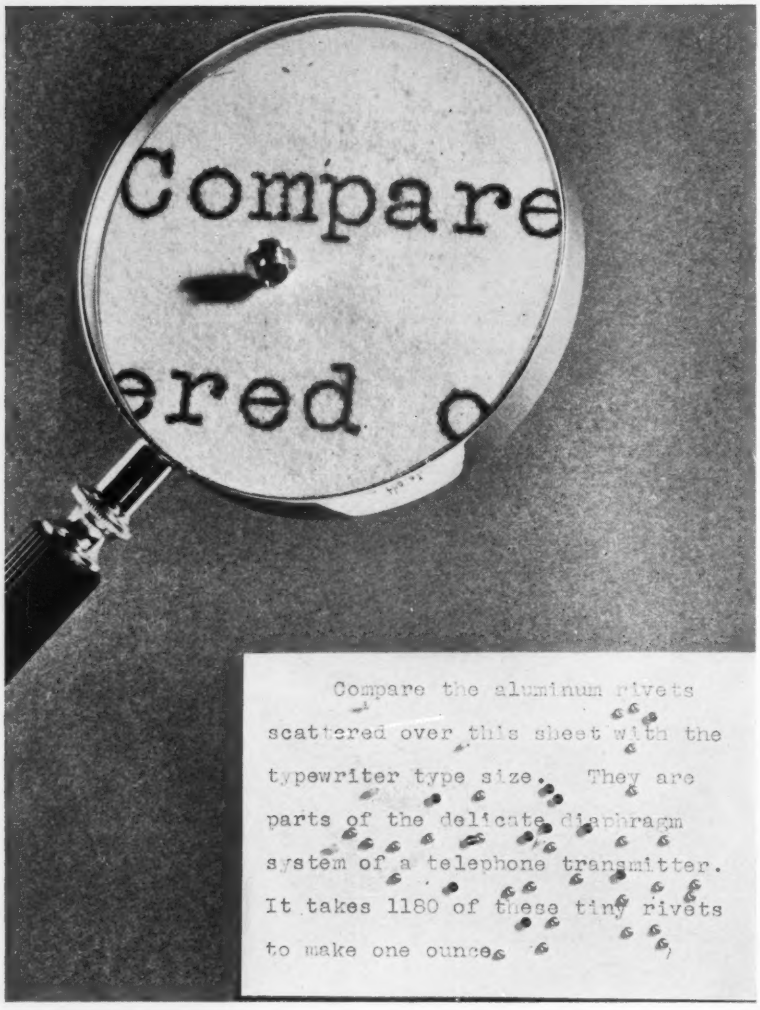
Factors Requiring Consideration in Working Stainless Steels

APART from corrosion-resisting properties other factors require consideration when choosing a stainless composition, such as ductility, malleability, cold working and fabrication in the drawn condition, and while certain compositions have been standardised, additions or modifications require


Compare
ered
Compare the aluminum rivets
scattered over this sheet with the
typewriter type size. They are
parts of the delicate diaphragm
system of a telephone transmitter.
It takes 1180 of these tiny rivets
to make one ounce.

Rivets made from aluminum wire stock. (Courtesy of Aluminum Co. of America). ✦ ✦

to be made to meet specific requirements. The word stainless has little meaning when applied to a hot rolled or drawn bar, which at this point of processing has in general a black appearance or at the best a dull grey, and no matter what depth of polish may be given the retention of corrosion-resisting properties under adverse conditions is dependent at all times on the efficiency of prior treatment to which it has been subjected.

✦ ✦ ✦

New Laboratory Heater Announced

SUPPLEMENTING its present line of laboratory heaters and hot plates, the **Precision Scientific Company,** 1736-54 N. Springfield Avenue, Chicago, announces their new Ful-Kontrol Laboratory Heater, which adjusts from 0 to 750 watts, for mild or intense heating.

✦ ✦ ✦

THROUGHOUT the full range of heat control, variation is virtually stepless, actually running up the scale in increments of less than one volt.

✦ ✦ ✦

THE secret is a built-in auto-transformer instead of a conventional rheostat. Not only does the heat control cover a wide range, but heat dissipation is reduced, as a characteristic of the auto-transformer.

✦ ✦ ✦

THE development of this item is of unusual significance to laboratory workers because it represents a radical departure from the usual apparatus-builder's practice of restricting its usefulness by designing it only for a single application. The Ful-Kontrol Heater, unlike its predecessors, is offered with any one of several interchangeable tops, at no extra cost, and accommodates several useful accessories.

✦ ✦ ✦

COPIES of this catalog may be obtained by addressing the Editor of WIRE AND WIRE PRODUCTS.

✦ ✦ ✦

Pheoll Announces New Price List for Screws, Bolts, Nuts and Related Items

THE Pheoll Manufacturing Company are now distributing their 1937 Catalog. This 108-page catalog contains the latest price lists for Screws, Bolts, Nuts and related items. American Standard Screw Thread Specifications, Dimension Tables, Weight Tables, and other practical and authoritative information are included in the reference section of this catalog.

✦ ✦ ✦

A cut index provides for quick reference to their complete line of manufacture and is a time-saving feature.

✦ ✦ ✦

COPIES of this catalog may be obtained by addressing the Editor of WIRE AND WIRE PRODUCTS.

✦ ✦ ✦

New Cement for Polishing Wheels

A NEW cement for polishing wheels is announced by **Midwest Abrasive Company,** of Detroit, according to James T. Jackson, president. It is intended to replace glue and is offered as a simplified method of preparation, requiring no heat. By the use of a special thinner, any density of cement required can be made up so that wheels of varying densities can be uniformly surfaced. This feature permits exact regulation for wheels of canvas, leather, felt, sheepskin, wood covered with leather, compressed leather or felt.

✦ ✦ ✦

THE policy of the company is to send generous sized samples of the product to those interested in its use. Readers of this journal are invited to take advantage of this offer.

Wire Association Questions and Answers

Question 3014

Will you please advise the writer where it is possible for us to secure a chart for the insulated wire industry, showing gauge of wire—number of strands, rubber insulation, center mills and all other data necessary in the various sizes of flexible cord?

✦ ✦ ✦

Answer No. 1

"THERE is no universal fixed standard for flexible cords that gives all constructional details. The "Underwriters' Laboratories' Standard for Flexible Cord and Fixture Wire" is the governing standard for approved material. This gives minimum requirements and make-up of the various types of cords and will no doubt answer the purpose of your correspondent.

✦ ✦ ✦

"DETAILS not covered by the above Standard would have to be obtained from individual manufacturers as the practices, particularly in regard to conductor stranding, are not the same in all cases."

✦ ✦ ✦

Answer No. 2

"IN reply to your inquiry we tabulate in Table A the following information, showing in column 2 the normal stranding scheme with flexible cords in accordance with the sizes in column 1. The stranding schemes in columns 3 and 4 are confined to the asbestos insulation heater cord types. I have given the c.m. area of each of these sizes in column 5 and the diameter in mils in column 6.

✦ ✦ ✦

"FOR fixture wiring a heat resistant insulation is required.

✦ ✦ ✦

"FOR drop cord the trade normally uses a twisted pair with a 1/32" rubber and dry glazed cotton braid over each conductor.

✦ ✦ ✦

"FOR portable lamp use the industry used a twin parallel cord with either a 1/64" or 1/32" rubber over each conductor, soft dry cotton braid over each, and use a rayon braid over all.

✦ ✦ ✦

"FOR portable use the industry purchases what is known as a type P 1/32" rubber on each, or type PS 1/64" rubber insulation on each with a rubber compound over twisted pair conductor having a cotton braid on each and a dry black or soft cotton yarn over all.

The Wire Association is for the specific purpose of improving production methods. It was organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The inquiries discussed were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

"THERE are also some plain rubber jacketed cords on the market having similar construction, but with 40% or 60% compound over all and no outside jacket or braid."

✦ ✦ ✦

Answer No. 3

"WE are in receipt of your letter inquiring for a chart for the insulated wire industry showing gauge of wire, etc. This information can be obtained from the Underwriters Laboratories, 161 Sixth Ave., New York, N. Y."

TABLE A

Size AW Gauge	No. Strands No. 30 bare	No. Stds. No. 32	No. Stds. No. 34	C. M. Area	Diameter In Mils
22 -	7	10	16	642	25.35
20 -	10	16	26	1022	31.96
18 -	16	26	41	1624	40.30
16 -	26	41	65	2583	50.82
14 -	41	65	104	4107	64.08
12 -	65	104		6530	80.81
10 -	104				

✦ ✦ ✦

Answer No. 4

"WE are in receipt of your letter in reference to chart for gauge of wire and rubber insulation and would state that we do not know of any chart that is in existence."

✦ ✦ ✦

Answer No. 5

"IN response to the question on the chart for specifications of flexible cord, I know of no standard on these cords, as it is my understanding that it does not fall within the province of the underwriters. I do not believe that there are any specifications to issue."

✦ ✦ ✦

"THERE are cords and cords—especially when it comes to quality of the rubber—as you no doubt have experienced in your home. In my opinion it is a field in which there should be some minimum specification principally for the avoidance of fire hazard. However, I am unable to assist you as to where to go for the specifications you seek."

✦ ✦ ✦

Answer No. 6

"I HAVE your letter regarding insulated wire specifications, and wish to say I do not have this information which one of our members asked for.

✦ ✦ ✦

"THE only way I have been able to get it is by referring to different members' catalogs. One of the best catalogs of this type is published by John A. Roebling's Sons Company of Trenton, N. J. given entirely to copper wire products. I always refer to this catalog when I am seeking the information this member asked for.

✦ ✦ ✦

"I WOULD suggest if this member is unable to secure the above catalog that he obtain the one put out by Belden Manufacturing Company of Chicago."

✦ ✦ ✦

Answer No. 7

"IN answer to your letter regarding specifications for flexible cord I would suggest that you have interested party write to Underwriters Laboratory, 205 East Ohio Street, Chicago, Ill., for a complete set of specifications on all types of flexible cords."

✦ ✦ ✦

Answer No. 8

"REPLYING to your inquiry in reference to specifications for flexible cords, we believe that the Underwriters Laboratory is the proper source of information, either that or the National Electrical Manufacturers Association."

✦ ✦ ✦

Answer No. 9

In reply to the above inquiry, the tables on the following pages fully and completely answer the member's question. These tables were supplied through the courtesy of General Cable Corp., New York, N. Y.

FLEXIBLE CORD TABLES

(Courtesy General Cable Corp., New York, N. Y.)

Trade Name	Type of Wire or Cord	Awg Size of Conductors	Number of Conductors	Insulation on Individual Conductors		Kind of Braid on Each Conductor	Assembly of Conductors	Jacket		Outer Covering	
				Kind of Insulation	Minimum Thickness in 64ths of an Inch			Kind of Jacket	Minimum Thickness in 64ths of an Inch	Number	Kind
Asbestos-covered Heat-resisting Fixture Wire	AF	18, 16 and 14	1	Impregnated Asbestos	2	None					
Cotton-covered Heat-resisting Fixture Wire	CF	18, 16 and 14	1	Impregnated Cotton	2	None					
Rubber-covered Fixture Wire	RF-64	18	1	Code Rubber	1	Cotton					
	RF-32	18 and 16	1	Code Rubber	2	Cotton					
Flexible Rubber-covered Fixture Wire	FF-64	18	1	Code Rubber	1	Cotton or Rayon					
	FF-32	18 and 16	1	Code Rubber	2	Cotton or Rayon					
Asbestos-covered Tinsel Cord	AT	27	2 or 3	Unvulcanized Rubber and Asbestos	Rubber - 1	Cotton	Twisted Together	None		1 or None	Cotton or Rayon
Cotton-covered Tinsel Cord	CT	27	2 or 3	Code Rubber	1	Cotton	Twisted Together	None		1 or None	Cotton or Rayon
Rubber-Jacketed Tinsel Cord	ATJ	27	2 or 3	Unvulcanized Rubber and Asbestos	Rubber - 1	Cotton	Twisted Together	40% Rubber	1	None	
	CTJ	27	2 or 3	Code Rubber	1	Cotton	Twisted Together	40% Rubber	1	None	
Asbestos-covered Heat-resisting Cord	AFC	18, 16 and 14	2 or 3	Impregnated Asbestos	2	Cotton or Rayon	Twisted Together	None		None	
	AFPO	18, 16 and 14	2	Impregnated Asbestos	2	None	Parallel	None		1	Cotton or Rayon
	AFPD	18, 16 and 14	2 or 3	Impregnated Asbestos	2	None	Twisted Together	None		1	Cotton or Rayon
Cotton-covered Heat-resisting Cord	CFC	18, 16 and 14	2 or 3	Impregnated Cotton	2	Cotton or Rayon	Twisted Together	None		None	
	CFPO	18, 16 and 14	2	Impregnated Cotton	2	None	Parallel	None		1	Cotton or Rayon
	CFPD	18, 16 and 14	2 or 3	Impregnated Cotton	2	None	Twisted Together	None		1	Cotton or Rayon
Parallel Cord	PO-64	18	2	Code Rubber	1	Cotton	Parallel	None		1	Cotton or Rayon
	PO-32	18 and 16	2	Code Rubber	2	Cotton	Parallel	None		1	Cotton or Rayon
	PO	14 and larger	2	Code Rubber	14-10 Awg - 3	Cotton	Parallel	None		1	Cotton or Rayon
All-rubber Parallel Cord	POSJ-64	18	2	30 per cent Rubber	1	None	Parallel	40% Rubber	1	None	
	POSJ-32	18 and 16	2	30 per cent Rubber	2	None	Parallel	40% Rubber	1	None	
Lamp Cord	C	18 and larger	2 or more	Code Rubber	18-16 Awg - 2 14-10 Awg - 3	Cotton	Twisted Together	None		None	

Trade Name	Type of Wire or Cord	Awg Size of Conductors	Number of Conductors	Insulation on Individual Conductors: Kind of Insulation	Insulation on Individual Conductors: Minimum Thickness in 64ths of an Inch	Kind of Braid on Each Conductor	Assembly of Conductors	Jacket: Kind of Jacket	Jacket: Minimum Thickness in 64ths of an Inch	Outer Covering: Number	Outer Covering: Kind
Twisted Portable Cord	PD	18 and larger	2 or more	Code Rubber	18-16 Awg - 2 14-10 Awg - 3	Cotton	Twisted Together	None		1	Cotton or Rayon
Reinforced Cord	P-64	18	2 or more	Code Rubber	1	Cotton	Twisted Together	Rubber	1	1	Cotton
	P-32	18 and 16	2 or more	Code Rubber	2	Cotton	Twisted Together	Rubber	1	1	Cotton
	P	14 and larger	2 or more	Code Rubber	14-10 Awg - 3	Cotton	Twisted Together	Rubber	1	1	Cotton
Moisture-proof Reinforced Cord	PWP-64	18	2 or more	Code Rubber	1	Cotton	Twisted Together	Rubber	1	1	Moisture-proofed Cotton
	PWP-32	18 and 16	2 or more	Code Rubber	2	Cotton	Twisted Together	Rubber	1	1	Moisture-proofed Cotton
	PWP	14 and larger	2 or more	Code Rubber	14-10 Awg - 3	Cotton	Twisted Together	Rubber	1	1	Moisture-proofed Cotton
Braided Heavy Duty Cord	K	18 and larger	2 or more	Code Rubber	18-16 Awg - 2 14-10 Awg - 3 8-2 Awg - 4	Cotton	Twisted Together	None		2	Moisture-proofed Cotton
Junior Hard Service Cord	SJ	18 and 16	2, 3 or 4	30 per cent Rubber	2	None	Twisted Together	40% Rubber	2	None	
Hard Service Cord	S	18 to 10, incl.	2 or more	30 per cent Rubber	18-16 Awg - 2 14-10 Awg - 3	None	Twisted Together	40% Rubber	18-16 Awg - 4 14 Awg - 5 12-10 Awg - 6	None	
Elevator Cable	E	18 and larger	2 or more	Code Rubber	18-16 Awg - 2 14-10 Awg - 3 8-2 Awg - 4	Cotton	Twisted Together	Rubber or None	1	1 or 3	See Pars. 19D-92, incl.
	ES	18 and larger	2 or more	30 per cent Rubber	18-16 Awg - 2 14-10 Awg - 3 8-2 Awg - 4	None	Twisted Together	40% Rubber	18-16 Awg - 4 14 Awg - 5 12-2 Awg - 6	None	
Rubber Jacketed Heat-resisting Cord	AFS	18, 16, and 14	2 or 3	Impregnated Asbestos	2	None	Twisted Together	40% Rubber	2	None	
	AFSJ	18 and 16	2 or 3	Impregnated Asbestos	2	None	Twisted Together	40% Rubber	2	None	
Heater Cord	HC	18, 17, 16, 15, and 14	2 or 3	Unvulcanized or Code Rubber and Asbestos	Rubber - 1	Cotton	Twisted Together	None		None	
	HPD	18, 17, 16, 15, and 14	2 or 3	Unvulcanized or Code Rubber and Asbestos	Rubber - 1	None	Twisted Together	None		1	Cotton or Rayon
	HSJ	18, 17, 16, 15, and 14	2 or 3	Unvulcanized or Code Rubber and Asbestos	Rubber - 1	Cotton or None	Twisted Together	40% Rubber	2	See Par. 194	
Christmas Tree Cord	X	20	2	Code Rubber	1	Cotton	Twisted or Parallel	None		1	Cotton or Rayon
	CX	18	2	Code Rubber	2	Cotton	Twisted Together	None		None	

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in Jan. 1937 and Jan. 1936
(In Gross Tons)

	Jan. 1937	Dec. 1936	Jan. 1936
Wire rods	3,379	1,467	3,939
Hoops, bands and strip steel	8,410	5,220	4,954
Plain, black or galvanized iron or steel wire	4,200	5,389	5,030
Barbed wire and woven wire fencing	3,523	5,145	1,744
Woven wire screen cloth	126	119	74
Wire rope	215	292	409
Insulated iron or steel wire and cables—see analysis below			
Other wire and manufactures	539	832	365
Wire nails	1,087	890	675
Tacks	23	31	34
Other nails, including staples	203	266	153
Bolts, machine screws, nuts, rivets and washers	698	734	461
Total, these 11 classifications	22,403	20,385	17,838

Imports of Iron and Steel Wire Into The United States
(In Gross Tons)

Concrete reinforcement bars	772	254	131
Hollow bars and drill steel	164	125	205
Wire rods	1,626	1,386	1,974
Barbed wire	1,585	1,529	2,237
Round iron and steel wire	325	417	447
Telephone and telegraph wire	6	.....	.....
Flat wire and strip steel	282	289	232
Wire rope and strand	227	180	185
Other wire	278	259	109
Hoops and bands	2,141	1,670	1,899
Nails, tacks and staples	1,171	704	2,177
Bolts, nuts and rivets	24	23	18
Total, these 12 classifications	8,601	6,836	9,614

Exports of Insulated Wire and Cable, January 1937

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Insulated iron or steel wire and cable	1,952	$ 264	.....	.....
Rubber-covered wire	553,079	126,752	184,174	$36,361
Copper weatherproof wire	209,389	35,383	106,885	17,640
Copper telephone cable	52,230	7,957	120,647	14,211
Other insulated copper wire	641,715	109,463	104,447	15,754
Nickel-chrome electric resistance wire	44,811	58,648	.....	.....
Total, these 6 classifications	1,503,176	$338,467	516,153	$83,966

Lower Trade in 'Other' Plate Sufficient to Turn Export Volume Downward

COMPARING the January trade with that for the previous month, a lower volume of shipments prevailed in 35 classifications, a higher one in 28, and there was trade in 2 items not previously shown (relaying rails and card clothing). The sharp decline (14,878 tons) recorded in 'other' plate shipments was in itself sufficient to turn the export trend downward, other decreases of moment occurring in exports of skelp (2,837 tons), plain shapes (2,763 tons), fabricated shapes (1,657 tons), seamless casing and oil-line pipe (1,482 tons), and galvanized wire (1,142 tons). Pig iron shipments followed the sharpest upward trend when they topped the December trade by 10,238 tons, followed by the gains registered in black steel sheets (2,867 tons), hot-rolled strip steel (2,515 tons), wire rods (1,812 tons), and barbed wire (1,447 tons).

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Tin Plate Remains Leading Export Item

REACHING the extremely high total of 25,232 tons, tin plate remained the leading item of export within the semi-finished and finished iron and steel group, the principal markets (in a wide-spread trade) being China (3,776), Japan (3,660), Canada (2,703), Kwantung (1,612), and Brazil (1,601). Next came black steel sheets (13,356 tons) which likewise found numerous markets among which the principal ones were Canada (5,406), Soviet Russia (2,309), Mexico (1,422), China (1,355), and the United Kingdom (759). Pig iron (13,329 tons) ranked next and the bulk went to Japan (12,336), and the Union of South Africa (666). Following was 'other' plate (7,089 tons) which also found a wide range of markets with Canada (1,639), Japan (1,281), Sweden (707), and Norway (609) outstanding. Hot-rolled strip steel (6,066 tons) was the fifth product of importance and went practically all to Canada (5,035), and the United Kingdom (825). Then came galvanized steel sheets (5,496 tons) in a wide-spread trade, the outstanding markets being the Philippine Islands (2,938), Brazil (422), Cuba (342), and Colombia (293).

✦ ✦ ✦

North and Central America and West Indies Continues Leading Area

AGAIN the above-named area was the leading purchaser of iron and steel products (excluding scrap) from the United States when its January total amounted to 50,428 tons in accounting for 39.0 percent (30.0 percent in December) of all shipments made during the month. Next came the Far East with purchases aggregating 42,675 tons or 33.0 percent (20.0 percent) followed by South America (18,046 tons) which accounted for 14.1 percent (19.5 percent). Europe followed with a trade amounting to 12,376 tons, or 9.8 percent (24.0 percent), with Africa (5,318 tons) whose proportion was 4.1 percent (6.5 percent) last.

✦ ✦ ✦

Canada Remains Leading Individual Purchaser

THE United States during January shipped 29,548 gross tons of iron and steel products (excluding scrap) to Canada, that market remaining the leading individual outlet. The outstanding items in this wide-spread trade were black steel sheets (5,406), hot-rolled strip steel (5,035), 'other' steel bars (4,104), tin plate and taggers' tin (2,703), plain shapes (2,574), and cold-rolled strip steel (2,126). Next came Japan (19,719 tons) the chief products in the trade being

pig iron (12,336), tin plate and taggers' tin (3,660), wire rods (1,849), and 'other' plate (1,281). Following, the Philippine Islands took 7,937 tons in a varied trade, with galvanized steel sheets (2,938), tin plate and taggers' tin (973), light rails (549), and wire nails (452) outstanding. Mexico (7,907 tons) ranked fourth in a varied trade in which ingots (1,623), black steel sheets (1,421), welded black steel pipe (472), barbed wire (470), and welded casing and oil-line pipe (441) predominated. Shipments to China (7,568 tons) were next in importance and were chiefly tin plate and taggers' tin (3,776), black steel sheets (1,355), and galvanized iron sheets (729). Guatemala with purchases aggregating 4,366 tons was the sixth market, and in this trade the outstanding products were heavy rails (2,135), welded galvanized steel pipe (974), cast-iron pressure pipe (488), and fabricated structural shapes (326).

✦ ✦ ✦

Imports Lower Than Last Year

IRON and steel imports (excluding scrap) into the United States during January totaled 40,642 gross tons valued at $1,716,324 against 42,775 valued at $1,706,333 in December, 1936. Comparing the January totals with those for the previous month, higher shipments were received in 23 classifications, lower in 13, while in 3 no trade occurred in either month. The outstanding gain (2,616 tons) was registered in structural shape imports, followed by those in pig iron (2,011 tons), solid and hollow bars (1,628 tons), concrete reinforcing bars (518 tons), and 'other' hoops (471 tons). The sharpest decline (3,200 tons) was that recorded in spiegeleisen imports, others of moment being recorded in ferro-manganese (1,305 tons), 'other' pipe (1,050 tons), and rails and track material (417 tons).

✦ ✦ ✦

Pig Iron Chief Item—Spiegeleisen Off Sharply

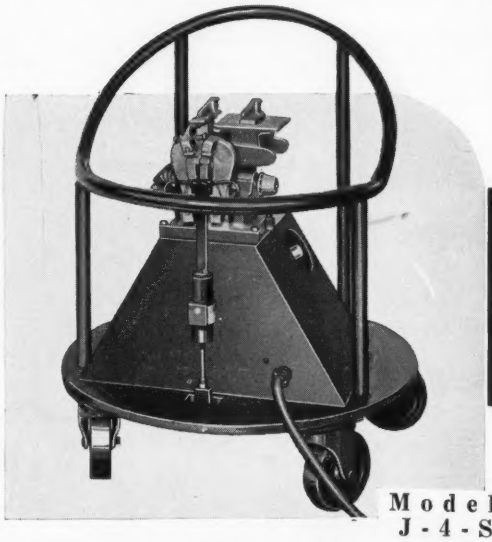
ON a tonnage basis, pig iron was the leading import item during January, a total of 12,434 tons coming mostly from British India (5,404), the Netherlands (4,652), and Soviet Russia (1,614). Shapes (7,919 tons) were next with Belgium (5,971) and France (1,815) the leading suppliers. Then followed solid and hollow bars (5,104 tons) chiefly from Belgium (3,529), and France (1,046), with ferro-manganese (2,370 tons) next in importance and supplied mostly by Norway (1,953) and the Netherlands (282). 'Other' hoops and bands (2,141 tons) followed and came principally from Belgium (1,483), and France (603). Wire rods (1,626 tons) made up the sixth product with Sweden (1,475) the outstanding supplier.

✦ ✦ ✦

Belgium Continues Ranking Supplier

BELGIUM remained as the leading supplier of iron and steel products (excepting scrap) to the United States during January, its

(*Please turn to page 218*)



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Low Type MICRO-WELD MODEL (Only 31" high)

Model J-4-S

The wide-spread demand for a portable, low-type welder is successfully met by this new MICRO Model J-4-S.

Height to welding dies—23".

Round steel base—no corners or edges to catch wires.

Frame—heavy rolled steel plates, arc welded.

Welding headpieces—hard bronze.

Full swivel casters—easy to move in any direction.

Guard rail—protects working parts.

Annealing dies for use on hard rolled and high carbon material—regular equipment.

Welding capacity —8 to 18 gauge.

Quickly proves its convenience and efficiency wherever in use.

Works close to reel for galvanizing and other applications.

Micro Model J-4-S solves many perplexing welding problems.

Micrometer Precision MICRO-WELD

Trade Mark Reg. U.S. Pat. Off.

Write for complete details.

MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE, CHICAGO, ILLINOIS

Telephone 7468

General Office and Factory, Peoria, Illinois

A Review of Recent Wire Patents

No. 2,067,746, LAMP FILAMENT AND METHOD OF MANUFACTURE THEREOF, Patented January 12, 1937 by Rolland M. Zabel, Lynnfield, Mass., assignor to Hygrade Sylvania Corporation, Salem, Mass., a corporation of Mass.

This filament is of doubly convoluted wire for lamp or tube filaments.

✦ ✦ ✦

No. 2,067,972, WIRE STRAIGHTENING MACHINE, Patented January 19, 1937 by Jacob T. Leech, Beaver, Pa.

It is stated that this machine is adapted for handling large diametered wires, to be subsequently cut up into rods.

✦ ✦ ✦

No. 2,068,224, WIRE FABRIC MAKING MACHINE, Patented January 19, 1937 by Arthur Ernest Blashill, Withington, Manchester, England.

The machine is adapted for handling line and stay wires which are connected at their inner sections by wire locks. A new device is provided for forming the lock staples and positioning them about the intersecting wires.

✦ ✦ ✦

No. 2,068,330, STRAND HANDLING APPARATUS, Patented January 19, 1937 by Richard D. Jessup, La Grange, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The apparatus is adapted for coating wire with insulating material, clamping

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

means being provided for gripping the wire and holding it against advancement on the independently rotating capstan without stopping the rotation of the latter.

✦ ✦ ✦

No. 2,068,352, TUNGSTEN WIRE REDUCING MACHINE, Patented January 19, 1937 by Henry V. Schlacks, Berwyn, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

More specifically, the machine is provided for testing tungsten wires.

✦ ✦ ✦

No. 2,068,675, METHOD OF AND APPARATUS FOR MANUFACTURING SCREENS, Patented January 26, 1937 by Richard D. Heller, Boise, Idaho.

The apparatus is adapted for manufacturing wire screens, having wire reinforcements.

✦ ✦ ✦

No. 2,068,836, APPARATUS FOR DRAWING AND REELING WIRE, Patented January 26, 1937 by Herman Zarafu, West New York, N. J., assignor to Elevator Supplies Company, Incorporated, Hoboken, N. J., a corporation of New Jersey.

Where there is provided a wire drawing unit having a relatively powerful motor capable of driving the drums which pull the wire through the dies, this inventor provides a reeling unit comprising a reel and having a relatively weak motor capable of driving the reel to maintain a desired tension on the wire coming from the drawing unit, there being gearing for connecting the reel with the wire drawing unit, so as to be driven by the motor of the latter. A clutch is provided for disconnecting the gearing from the reel when the drawing unit and the reeling unit have attained a desired operating speed.

✦ ✦ ✦

No. 2,068,940, ELECTRIC CABLE, Patented January 26, 1937 by Robert J. Wiseman, Paterson, N. J., assignor to The Okonite Company, Passaic, N. J., a corporation of New Jersey.

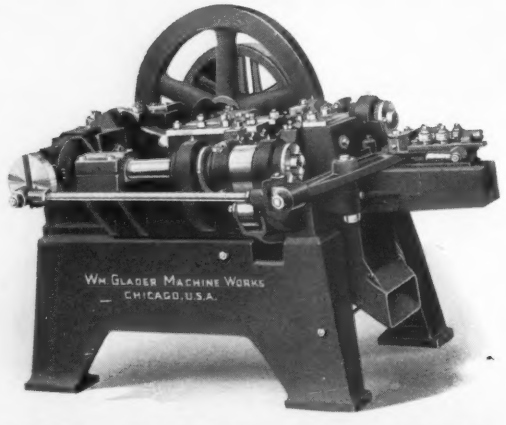
About the rubber insulated wires is a metal pipe of greater cross section than the wires and their insulation so that a considerable space is provided and in this space is a mixture of nitrogen and helium.

✦ ✦ ✦

No. 2,069,087, APPARATUS FOR THE MANUFACTURE OF INSULATED WIRE, Patented January 26, 1937 by Edward W. Forstrom and Clifford O. Hull, Stratford, Conn., assignors to General Electric Company, a corporation of New York.

Among the objects of this invention is to increase the speed of vulcanizing rubber covered wires.

HIGH SPEED WIRE NAIL MACHINE



WM. GLADER MACHINE WORKS

210 N. Racine Ave., Chicago, Illinois

Glader Machines are fast, easy to operate, and are highly efficient.

If you are planning on nail plant expansion or replacements let us figure with you.

Glader Machines have been adopted as standard equipment in all recent major nail mill installations.

There must be a reason.

For further information, prices, etc. write to us.

A Review of Recent Wire Patents

No. 2,067,973, STRAND WORKING APPARATUS, Patented January 19, 1937 by Edwin J. McIlvried, Akron, Ohio, assignor to The Vaughn Machinery Company, Cuyahoga Falls, Ohio, a corporation of Ohio.

More specifically, the inventor provides a new device for distributing compound to the stand-working means for automatically slackening the strand upon stopping of the spooling means.

✦ ✦ ✦

No. 2,069,203, PRODUCTION OF RUSTLESS IRON, Patented February 2, 1937 by William B. Arness, Baltimore, Md., assignor, by mesne assignments, to Rustless Iron and Steel Corporation, Baltimore, Md., a corporation of Delaware.

This inventor has provided a process for the production of nitrogen-containing rustless iron wherein metal of a desired nitrogen content is secured.

✦ ✦ ✦

No. 2,069,204, PRODUCTION OF RUSTLESS IRON, Patented February 2, 1937 by William B. Arness, Baltimore, Md. assignor by mesne assignments, to Rustless Iron and Steel Corporation, Baltimore, Md., a corporation of Delaware.

In the production of nitrogen-containing rustless iron and steel of fine grain structure, the inventor claims to have provided a process which minimizes a loss of nitrogen and the production of sound metal.

✦ ✦ ✦

No. 2,069,205, METHOD OF PRODUCING IRON CHROMIUM ALLOYS OF APPRECIABLE NITROGEN CONTENT, Patented February 2, 1937 by William B. Arness, Baltimore, Md., assignor, by mesne assignments, to Rustless Iron and Steel Corporation, Baltimore, Md., a corporation of Delaware.

The process, covered by this patent, includes preparing and maintaining a bath of ferrous metal containing chromium in intimate contact with nascent or atomic nitrogen gas introduced into the presence of this bath.

✦ ✦ ✦

No. 2,069,471, ANTIFRICTION SCREW, Patented February 2, 1937 by Donald J. Baker, Pasadena, California.

A bearing race is formed on one face of the thread of this screw and spaced from the root thereof for cooperation, with suitable bearings, with a nut, a retainer being provided and located between the screw and nut for maintaining the bearings in spaced relation.

✦ ✦ ✦

No. 2,070,035, WIRE COATING MECHANISM, Patented February 9, 1937 by George Weiss, Des Plaines, Ill., assignor to Standard Cap and Seal Corporation, Chicago, Ill., a corporation of Virginia.

Apparatus is provided for uniformly regulating tension of a wire core to be coated so that the cross sectional area of the core is maintained constant during the coating process.

✦ ✦ ✦

No. 2,070,141, ELECTRIC CABLE, Patented February 9, 1937 by William C. Robinson, Sewickley, Pa., and Otto A. Frederickson, Glen Ridge, N. J.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

In this cable, the return wire is provided with considerably less insulation than the working volt wire, in contradistinction to providing substantially similar coatings for volt wire or providing no coating whatever for the return wire.

✦ ✦ ✦

No. 2,070,361 WIRE LOOM WITH WEFT GRAB BARS, Patented February 9, 1937 by Willi Klemm, Neustadt-on-the-Orla, Germany.

It is stated that new gripping means is provided for the weft wires so either smooth or crimped wire may be laid across the warp, and the weft wires maintained under sufficient constant tension to effect operation of the gripping means carried by each weft bar.

✦ ✦ ✦

No. 2,070,678, COAXIAL CONDUCTOR SYSTEM, Patented February 16, 1937 by Todos M. Odarenko, New York, N. Y., assignor to Bell Telephone Laboratories Incorporated, New York, N. Y., a corporation of New York.

Provided more specifically for radio frequency signals, the inventor has endeavored to obtain a proportioning of the diameters of a pair of coaxial wire conductors which is the optimum with respect to signal attenuations.

Speaking of experience:

The Balloffet organization has been known as one of the foremost diamond die manufacturers since 1870. Besides the sales on the American market, Balloffet diamond dies are also sold regularly in several other countries, including France, England, Germany, Austria, Italy, Sweden, Japan, Canada. Because of the huge and varied requirements of their customers the world-over, and because of the broad experience acquired during those 67 years, it stands to reason that Balloffet's experts are particularly qualified to select the best stones available for the manufacture of reliable dies.

This ought to satisfy the trade that we have enough experience with the manufacture of diamond dies to be well able to take care of the most exacting requirements.

Balloffet Dies and Nozzle Co., Inc.

Quality Diamond Dies since 1870

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GUTTENBERG, N. J.

'Round the World With the Wire Industry

German Notes

DIFFICULTIES among members of the International Wire Rod Cartel arose in February, which made a final extension impossible. However, no collapse of the cartel is feared, as all members are for the extension of it and only some allotments will have to be fixed. The demand for wire rods continues to be extraordinarily heavy. The German works had to turn down most of this business because the spring wire season promises to be very satisfactory and will absorb large quantities of wire products.

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The Price Situation

WIRE prices are moving up quickly in Europe. It was somewhat of a sensation when the Swedish price for low C content wire rods was raised to 370 Kroner per ton, the highest price since the war. Prices in Czechoslovakia were advanced about 10%; in Belgium 5%; in Switzerland 25% for galvanized and 22% for bright. Prices for netting were advanced between 18 and 22% which has severely affected German domestic consumption. The actual wire prices in France are about 20% higher than the same time last year.

✦ ✦ ✦

ON the export market buyers are still paying premiums in order to get wire, and the premiums are up to 10 shillings per ton. Now that the buying season in certain markets, particularly the Far East and African markets is ended, it is probable that the situation will become slightly easier.

✦ ✦ ✦

German Exports

GERMAN wire rope exports last year amounted to 18,077 tons compared with 13,166 tons in 1935. The improvement in prices is continuing. German and foreign coal and ore mines are placing large orders for wire ropes. It is remarkable that the largest individual wire rope buyer has been India, purchasing 1,946 tons and the second largest, the United States, buying 1,877 tons, Italy buying almost the same quantity.

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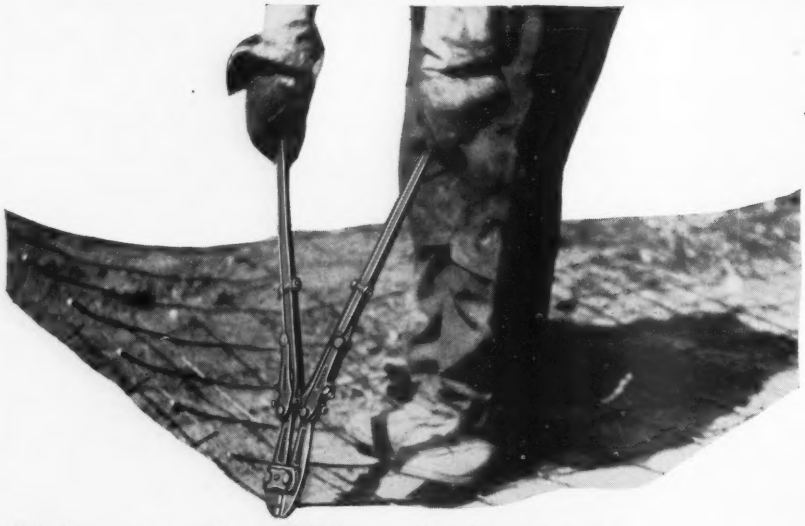
THE foreign trade during 1936 in wire products brought an advance of 28% in quantity and 31% in value of German cable exports, of 37% of bolt and nut exports, and 19% of rivet exports. The total export figures for wire was 197,139 tons as compared with 186,376 tons last year, and the export figure of wire products was up between 11 and 18% outside of those mentioned above. About one-third of the total German wire production is sold for export.

✦ ✦ ✦

EXPORTERS and manufacturers have warned the IWECO that the very extended shipment dates, in connection with the sharp advance of export quotation, particularly the advance of Japanese prices, is leading to another expansion movement of Overseas wire industries, which since 1930 have remained, with few exceptions, stagnant. Now, however, a



Aids to the Wire Industry:

PORTER CUTTERS

Indispensable in wire mills for sampling large wire.

In almost universal use by wire fabricators for cutting reinforcing fabric, fencing, spring wire, etc.

Useful in *any* plant, large or small, for all sorts of maintenance and repair work—for cutting bolts, rods, wires, rivets, wire rope, chain; or for splitting deformed or "frozen" nuts.

Remember—every Porter tool is specifically designed and correctly built for the work it is to do. There is a Porter tool for every cutting job up to ¾ in. annealed bolts or ½ in. hardened chain.

Ask your supply house, or write for descriptive literature.

H. K. PORTER, INC., EVERETT, MASS.

'Round the World With the Wire Industry

great number of Overseas wire industries are feeling that they may enter an expansion program and have already placed orders for machinery, which ultimately must affect the German export industries. It seems, however, that the present machinery buying of Overseas industries is more for replacing obsolete machinery than construction of additional plants.

✦ ✦ ✦

Higher Prices in Czechoslovakia for Drawn Wire and Wire Nails

EFFECTIVE January 25, 1937, the Cartel of **Czechoslovak** manufacturers of drawn wire and wire nails reached a decision to increase the basic price of those items by 8 crowns per 100 kilogram, representing an average increase of about 2.5 percent over the price which prevailed prior to that date, according to word from Acting Commercial Attache Jule B. Smith, Prague.

✦ ✦ ✦

Agreement Between Czechoslovak Cartel and German Organization

EFFECTIVE January 11, 1937, the **Czechoslovak** Wood Screw Cartel "Vrut", Prague, (representing six Czechoslovak wood screw manufacturers) and the **German** Wood Screw Cartel "Helzschraubenverband", Duesseldorf, (representing 10 German producers), made an agreement (to terminate December 31, 1937) providing for mutual protection of their domestic markets by fixing export quotas.

✦ ✦ ✦

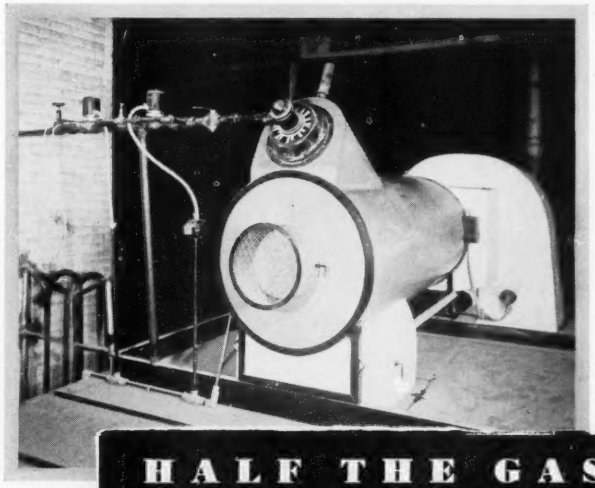
Medart Announces New District Sales Office

THE Medart Company of St. Louis, Mo., manufacturers of power transmission machinery, announce the opening of a District Sales Office in Room 1559, Dierks Building, Kansas City, Mo., with **Mr. W. A. Crooks,** an experienced Power Transmission Engineer in charge.

How to Weld Twenty-Nine Metals

A comprehensive book, entitled "How to Weld 29 Metals", covering the procedure, conditions and materials for welding modern alloys has recently been published by the Westinghouse Electric and Manufacturing Company. Specific data for welding all types of joints with varying thicknesses of metal, such as electrode diameter, welding current, speeds, deposition, etc., are included. Prepared by Chas. H. Jennings, whose experience and exhaustive investigation into the joining of metals have eminently qualified him as an authority on the subject, this book should be of great value to welding operators in simplifying and im-

(*Please turn to page 210*)



HALF THE GAS— TWICE THE ROD

Here is a profit that works in two directions—A saving of fuel running as high as 50%, plus a material increase in production, both at the same time. This is the actual experience of many users of Morrison rod bakers and may be yours also. Exclusive, modern Morrison design applied to the sound principle of recirculating forced convection heating is, today, effecting some amazing savings in wire mill operation. A letter will start an engineering survey, without obligation, to show the potential profits available through Morrison equipment in your business.

Other Morrison equipment is designed for annealing, heat-treating, and galvanizing; tank and pot heating; and other industrial process heating applications utilizing the recirculating forced convection method.

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THE IDEAL HEATING MEDIUM

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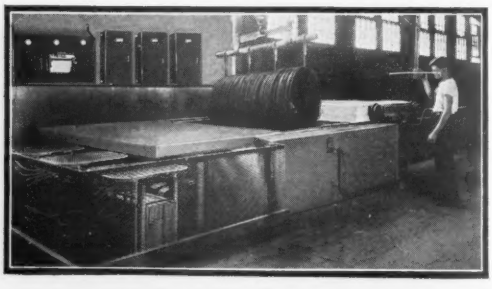
UNIFORMITY
PRESERVED SURFACE
CONTROLLED HEATING
EXACT TEMPERATURES

WIRE ANNEALING

LAVITE is a bath for controlled heating that does not deteriorate. Its unique characteristics produce uniform and more economical results, cleanly and rapidly.

LAVITE FURNACES

Built to meet your requirements for annealing.



Annealing Furnace

WRITE FOR COMPLETE LAVITE HEAT TREATING METHODS

THE BELLIS HEAT TREATING COMPANY
BRANFORD, CONNECTICUT

Round the World with the Wire Industry

(*Continued from page 209*)

proving the welding of present day metals and alloys. Copies of the book are available at 50 cents each from department 5-N, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania.

✦ ✦ ✦

Simplified Practice Recommendation for Color Code for Marking Steel Bars Approved

THE proposed Simplified Practice Recommendation for a Color Code for Marking Steel Bars has been accorded the required degree of acceptance by the industry and is to be promulgated as of April 1, 1937, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. The recommendation will be identified as Simplified Practice Recommendation R166-37.

✦ ✦ ✦

THIS recommendation, which was proposed and developed by the National Committee on Iron and Steel of the National Association of Purchasing Agents, is limited to a color code for marking commonly used grades of steel, as represented by S. A. E. numbers.

✦ ✦ ✦

UNTIL printed copies are available, complimentary mimeographed copies of this Simplified Practice Recommendation may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

✦ ✦ ✦

Republic Appoints Klemm, Manager of Sales, Bolt and Nut Division

ANNOUNCEMENT was made today by N. J. Clarke, vice president in charge of sales, Republic Steel Corp., of the following appointment:

✦ ✦ ✦

R. C. **Klemm** has been appointed manager of sales, bolt and nut division, to succeed C. F. Newpher, who has joined the National Screw & Mfg. Co. Mr. Klemm has been with Republic Steel and its predecessor companies for 25 years.

Bethlehem Steel Co. Announces Plans for New Rod and Bar Mill

IN conjunction with its building and improvement program that was made public in November, 1936, the Bethlehem Steel Company now announces plans for a new four-strand rod and bar mill and also increased wire drawing and finishing capacity at its Maryland Plant at Sparrows Point, Md.

✦ ✦ ✦

THE new mill will be located adjacent to the present rod mill, and will be tied in as a major unit in the Maryland Plant's existing rod and wire finishing facilities. It will use a common billet storage yard and deliver its rod products into an enlarged drawing and finishing unit which will be served also in part by the rod capacity of the present mill.

✦ ✦ ✦

IN the high speed, four-strand mill that the plans call for, four billets, rather than two as in the present two-strand mill, can be passed through the roll stands at one time. Also, the new four-strand mill will be operated at a higher speed. Its capacity can be rated at over 20,000 tons per month, almost double that of the existing mill.

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AMONG the other innovations in the layout will be facilities for finishing bars, as well as rods, in a separate building primarily designed for the production of reinforcing bars, which, incidentally, have not heretofore been produced at the company's Maryland Plant. However, the greater part of the product of the new mill will be converted into rods, both to meet the growing demands of manufacturers who draw upon Bethlehem as a source of rod supply, and to meet the greater demands of the enlarged wire drawing capacity and finished wire products capacity.

✦ ✦ ✦

THIS increased wire drawing capacity with the more ample source of rod supply that the new mill makes available will also allow for the increase that is being provided for in output of finished wire products, such as nails, barbed wire

(*Please turn to page 212*)

. . . that *RUNS SMOOTHLY* in Your Plant

Put Keystone wire through its paces. It wraps, bends, forms or welds with a precision that delights production men. That's because wire supplied by Keystone is perfectly suited to your requirements and specifications.

It may be one of the many wires regularly carried in stock, or it may be specially created for your use by Keystone technicians. But in either case you can be sure it is right in analysis, form and finish. You can rely on its uniformity.

Talk wire with Keystone. No obligation . . . and many advantages.

KEYSTONE

STEEL & WIRE CO. Dept. W., Peoria, Illinois

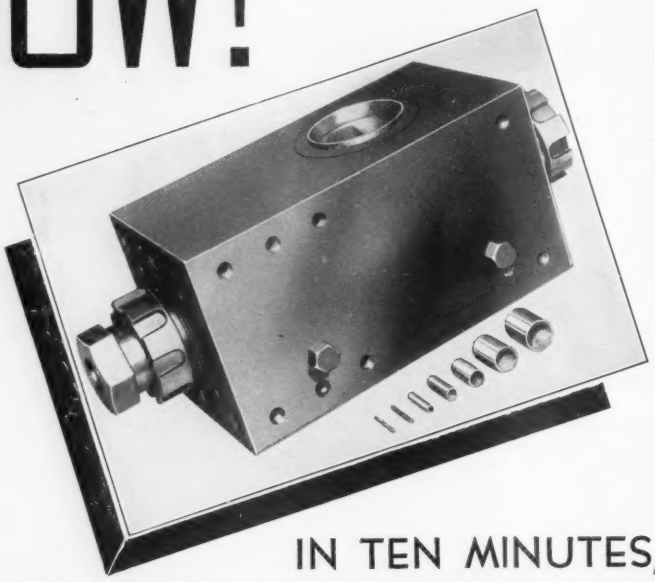
HIGH CARBON OR LOW CARBON

SAMSON SPRING WIRE

KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Bright, Annealed, Tinned, Coppered, Galvanized

NOW!



IN TEN MINUTES, CHANGE DIES and CORES WITHOUT MELTING ANY LEAD OUT OF DIE BLOCK

The Robertson Lead Encasing Die Block may be heated by gas in the usual manner, or may be heated with steam. A customer using one of these die-blocks, steam-heated, has it connected to his main steam line giving him a die-block temperature of approximately 350 degrees Fahrenheit. He writes in part:

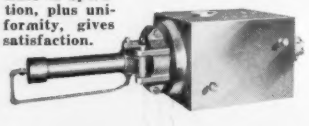
"We have no control apparatus on the die-block; however, we have a pyrometer indicating the temperature of four different points and we find there is only a variation of from one degree to three degrees at any of the four points indicated."

Uniformity of temperature contributes in a large measure to uniform lead wall thickness, uniform lead flow, uniform press stop marks, uniform products.

ROBERTSON DIE BLOCK with HYDRO-EJECTOR

For the larger sizes of the new Robertson quick-change die-blocks which lead encase cables up to 4" in diameter, a hydraulic core ejector, shown at lower right, is used to help in quickly removing cores and dies by means of hydraulic pressure obtained either from the press pump or from an individual direct-connected hand-operated hydraulic pump. The "sledge hammer method" is not used when changing cores and dies.

Ease of operation, plus uniformity, gives satisfaction.



John ROBERTSON CO. INC.

Pioneers~Since 1858

125-37 Water Street Brooklyn, N. Y.

Bethlehem Steel Co. Announces Plans for New Rod and Bar Mill

(*Continued from page 211*)

and bale ties, already important items of manufacture at this plant.

✦ ✦ ✦

DUE to the tidewater location of the Maryland Plant, the increased capacity will be of especial advantage to Bethlehem in expediting water shipments to the Atlantic seaboard, Gulf, and the Pacific Coast States. Included in the new unit are warehousing and bar fabricating facilities that will enable Bethlehem to make truck shipments of concrete reinforcing bars, directly from the warehouse, to the Baltimore and Washington markets. The production of reinforcing bars at the Maryland Plant will also afford a nearer and more adequate source of supply of this product through the company's present warehousing and fabricating facilities in Philadelphia and New York.

✦ ✦ ✦

THE cost of the new mill and enlarged facilities has not as yet been determined with exactitude, but it is a part of the $35,000,000 program that was announced in 1936.

✦ ✦ ✦

THE approximate additional employment that will be provided by the enlargement of the rod and wire mill will be 500 men. This is in addition to some 2,000 new jobs that have in part already been created at the Maryland Plant as a result of the program that is being carried out for increasing tin plate, and flat-rolled steel products capacity, including the erection of a 56-inch continuous strip-sheet mill. It is expected that the construction work will be completed in the early fall and the new plant will be in operation shortly thereafter.

✦ ✦ ✦

ARRANGEMENTS have already been made with the Consolidated Gas, Electric Light and Power Company of Baltimore for additional power supply, and a new transmission line is projected and under construction.

✦ ✦ ✦

WITH the completion of other miscellaneous improvements and betterments now in process—

the Maryland Plant will have a steel ingot capacity of upwards of 200,000 tons per month and modern facilities for a full line of products in rods, concrete reinforcing bars, wire, pipe, plates, skelp, rails, sheet, strips and tin plate.

✦ ✦ ✦

New Brown Flow Meter Catalog

THIS new Catalog (No. 2004) covers the complete line of Brown Flow Meters—Indicating, Recording and Integrating—in both Electrical and Mechanical Types—together with Brown Air-o-Line Flow and Liquid Level Controllers. It explains their application to Power Plant, Water Works and Gas Generation service, as well as to general industrial use.

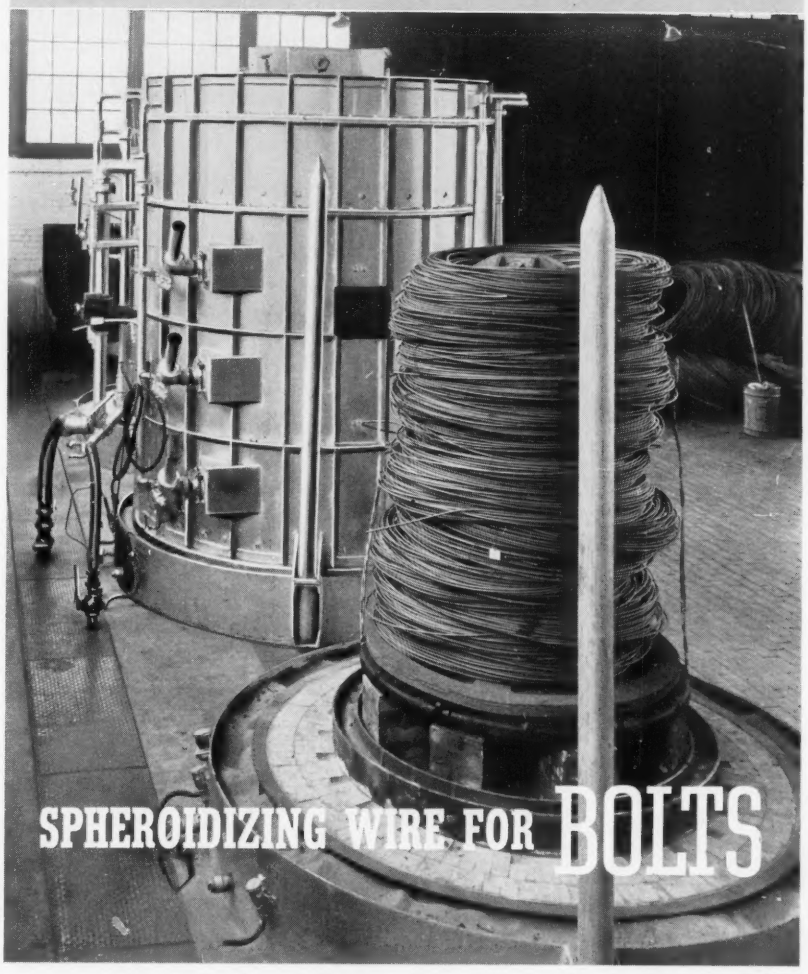
✦ ✦ ✦

CATALOG No. 2004 describes in simple, non-technical language, the operation of Brown Flow Meters and the construction of the Brown Orifice Plate. Similarly described are the features of both Electrical and Mechanical types of Brown Flow Meters—the Inductance Bridge Principle—the features of Brown Electric Meter Bodies for use on working pressures as high as 5000 lbs. per sq. in. and as low as 50 lbs. per sq. in.—the Brown Area Meter Bodies (cast iron for pressures up to 250 lbs. per sq. in. and cast steel for pressures up to 600 lbs. per sq. in.)—the Brown Mechanical Meter Body for pressures up to 2500 lbs.—the Brown Pressure Chamber Assembly in all types of Meter Bodies—the six Interchangeable Range Tubes which facilitate range changing in Brown Electrical and Mechanical Flow Meters — Brown Flow Meter Charts of both Square Root and Evenly Graduated Types—Electric Chart Drives as well as the Hand-wound Type—Automatic Planimeter—Integrator Dial of five-figure-counter type—the Brown Universal Case which is interchangeable for Wall, Front-of-Board or Flush Mounting — the Brown Water Level Gauge for High Pressure Steam Boilers—and the Indicating Scale for Brown Recording Flow Meters.

✦ ✦ ✦

COPIES of this catalog may be obtained by addressing WIRE AND WIRE PRODUCTS.

FURNACES FOR HEAT TREATING WIRE



Most modern equipment for spheroidizing wire is the SC gas-fired bell-type annealing cover—such as that one shown used by a large bolt manufacturer. Equipped with SC *radiant tube heating elements,* this furnace operates with high efficiency and economy. Fuel costs are low—less than 1.25 cu. ft. of 530 b.t.u. gas per pound of work heat treated is required. Net thermal efficiency is 34%. Ask SC engineers for further details on this and other type of gas-fired furnaces for heat treatment of wire.
SURFACE COMBUSTION CORPORATION . . . Toledo, Ohio

SURFACE COMBUSTION

Builders of ATMOSPHERE FURNACES and HARDENING, DRAWING, NORMALIZING, ANNEALING FURNACES for CONTINUOUS or BATCH OPERATIONS

NOW READY FOR DELIVERY!

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ROD, WIRE, STRIP AND BAR STOCK
INSULATED WIRE AND CABLE
WIRE PRODUCTS

SPRINGS, BOLTS, NUTS AND RIVETS, ROPE
SCREWS, COMMON PRODUCTS, WIRE CLOTH
FENCE, HOOPS AND BANDS, CHAINS

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MACHINERY, SUPPLIES AND EQUIPMENT
FOR THE PRODUCTION OF
WIRE, ROD, STRIP, BARS AND THEIR
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THE YEAR BOOK OF THE ASSOCIATION

MEMBERSHIP LIST — MEDAL AWARDS
CONSTITUTION — ASSOCIATION HISTORY

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✦ ✦ ✦

WIRE AND WIRE PRODUCTS

17 EAST 42nd ST. — NEW YORK, N. Y.

News and Notes of the Spring Industry

(*Continued from page 191*)

5. **Special spring problems such as investigation of the properties of the Belleville Spring, Air Springs, Rubber Springs.**
6. **Investigation of stress-strain relation in spring materials.**

✦ ✦ ✦

THE committee feels that the program of research as originally outlined five years ago has now been practically completed, and consequently it will soon inaugurate a new program of research with the aim of solving other problems of immediate interest to the industry. Some of the problems, the solution of which will be undertaken, in this new program of research, are the following:

1. **Exploration of the general properties of eliptic springs.**
2. **Investigation of the properties of helical springs of rectangular and eliptic section wire.**
3. **The effect of end-loops in helical extension springs.**
4. **The effect of decarburization upon the properties of springs.**
5. **The effect of internal strain in cold formed springs.**

✦ ✦ ✦

THE committee will, at an early date, send out a questionnaire similar to that which went to the industry five years ago, in order to obtain suggestions for further research problems with which to augment the program outlined above.

✦ ✦ ✦

Iso-Elastic Spring — Described at Scale Men's Association Meeting

ON March 25th, at a meeting of the Scale Men's Association at the Hotel Roosevelt in Pittsburgh, Mr. P. J. Bortell, vice-president of John Chatillon & Sons, New York City, described Iso-Elastic springs and their use in weight measuring instruments. After explaining the general use of helical wire springs in scales, Mr. Bortell demonstrated the effect of temperature changes on steel instrument springs. After this demonstration was made, heat and cold tests were made on a scale equipped with Iso-Elastic springs and it was demonstrated that the elasticity of this type of spring is substantially unaffected by temperature changes.

W. T. AVERY of Birmingham, England, has been recently granted an exclusive license to exploit Iso-Elastic products in Great Britain and a number of British possessions.

✦ ✦ ✦

Recent Literature on Springs

"Standards for Spring Design—Part I." W. M. Griffon, Product Engineering, March, 1937.

✦ ✦ ✦

CONTAINS specifications for spring materials and classifies according to type of service. Classes of spring service are listed as 1, in which the deflection cycles are rapid, uniform stress range and continuous, 2, in which the deflection cycles are rapid, varying stress range and intermittant, and 3, in which the deflection cycles are infrequent with varying stress or static loading.

✦ ✦ ✦

FOR Class 1 compression springs, music wire is used in sizes up to and including 0.105 in. For diameters from 0.1055 to 0.262 in. Swedish steel is used. For diameters greater than 0.262 carbon steel is used. Of the non-ferrous materials, only phosphor bronze shall be used for springs in Class 1 service.

✦ ✦ ✦

SURFACE specifications are based upon a hydrochloric acid etch to disclose surface defects.

✦ ✦ ✦

Advanced Sourcebook of Spring Knowledge

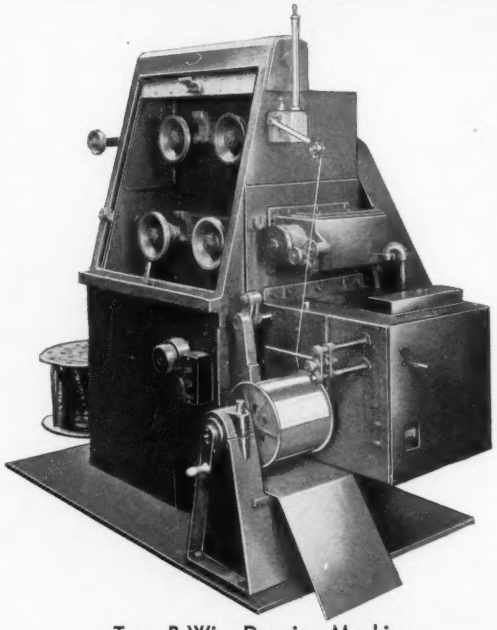
ONE of the most complete, semi-technical discussions of springmaking in all its forms is now offered by Barnes-Gibson-Raymond of Detroit and Ann Arbor, Mich. It represents a distinct advance over their last catalog published in 1931, and reflects in a high degree the current trend away from the stereotyped catalog of products. Eighty-eight pages of usable information about spring selection and design, most of it published for the first time, make this a book to be welcomed in any file of engineering data.

(*Please turn to page 217*)

ES

HIGH SPEED
WIRE DRAWING EQUIPMENT

A COMPLETE line, minimum slip, built primarily for high speed drawing — built for long life, efficient operation, economical production and clean and excellently wound quality wire.



Type B Wire Drawing Machine
Finished Wire No. 26 to 34 B & S Gauge
Finished Wire Speed, 5000 F.P.M.

Liberal proportioning, anti-friction mounting, efficient power transmission, freedom from belts or chains, positive variable speed drive to spoolers to maintain uniform wire speed, accurate wire tension control at the point of spooling are a few of the features contributing to long life, efficient operation, economical production, clean and excellently wound quality wire.

✦ ✦ ✦

A machine for every type of non-ferrous wire drawing. Six standard designs. All machines supplied with or without spoolers and with or without coilers.

✦ ✦ ✦

High Speed Insulating Machines
For Use With Paper — Cotton — Silk

Saturating and Finishing Equipment
For Weatherproof and Code Wire

Taping Machines for Cambric and Paper

Take-ups — Spoolers — Coilers

Complete Tinning Equipment

Other Equipment for Producing Wire and Cable

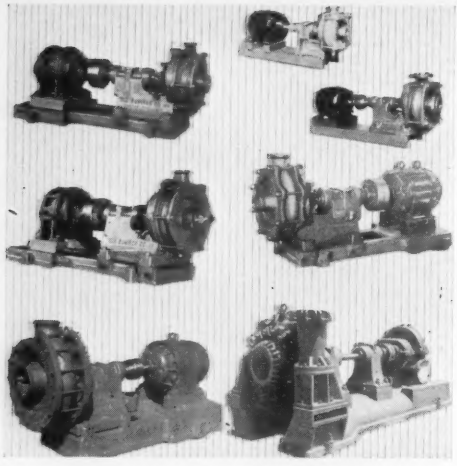
Let us show you what our equipment can do towards cutting production cost and improving quality.

ELEVATOR
SUPPLIES COMPANY, Inc.
RAHWAY, N. J.

EXECUTIVE AND SALES OFFICE
420 LEXINGTON AVE., NEW YORK, N. Y.

FACTORY
RAHWAY, N. J.

Corrosion-Resisting Pumps



CORROSION - resisting centrifugal pumps made by The Duriron Company range in capacity from 5 g.p.m. to 2000 g.p.m., and for heads up to 120 ft. Particularly advantageous to Wire Mills for use with sulphuric and hydrochloric acids . . . for tank car unloading . . . in the Cleaning Room . . . for waste acid disposal and acid recovery systems.

Many Wire Mills have standardized on these pumps, as they will handle almost any acid with low maintenance cost.

Write for Bulletin No. 172 which contains complete data on all sizes.

THE DURIRON COMPANY, Inc.
445 N. Findlay St. Dayton, Ohio

WHOEVER UNDERSTANDS GERMAN

Should Read

"Draht-Welt" (Wire World)

A weekly for the wire industry
and related lines.

Subscription price: Rm. 6.50 quarterly

Sample copies free on request from:

Martin Boerner — Verlag
Halle — Saale
Germany

The Wire Association Re-Elects Officers

(*Continued from page 183*)

ONE subject which might open up new fields of thought was brought up by F. A. Westphal, Superintendent Wire Mills, Sheffield Steel Corp., Kansas City, Mo., who stated:

"AS an operating man attempting to take the broadest perspective of operating, sales and management, I believe thoroughly that we should take cognizance of an economic fallacy of selling certain wire products. It is public information that the market demands that nails sell cheaper than the wire from which they are made; that barb wire sells cheaper than the galvanized wire from which it is made; that bale ties sell cheaper than the annealed wire from which they are made. Why should wire be punished and sacrificed for being manufactured into a finished product? Wire products, such as these, are used too much as "loss leaders" speaking in terms of cut rate stores, or like the "sugar item" speaking in terms of grocery stores. The Wire Industry uses items, such as these products, too much like a football.

✦ ✦ ✦

THIS unhealthy selling condition puts the operating man very much on the spot or in the dog house. I dare say that in some companies that the higher management does not analyze, realize or appreciate this faulty economic equation.

✦ ✦ ✦

OBVIOUSLY on any product the operating man manufactures, he must conceive the making of it at a cost low enough to stand the full load of operating costs, sales costs and essential overheads, and at the same time turn in some profit for the stockholders to get their share. What responsible operating man is not worrying about "red ink" in face of steadily increasing costs of labor, materials and taxes?

✦ ✦ ✦

A LOGICAL question right now is what are we going to do about it? I cannot answer that question and neither can anyone here because the question is too big and vast for us individually. But I do say this, that a bad price condition like this should be given plenty of thought and lots of air.

✦ ✦ ✦

FROM the aforementioned and speaking in defense of the operating, engineering and scientific departments of the Wire Industry, say "What the hell is expected—miracles?" Keep a stiff upper lip and don't ever stop trying though!

The 1937
Wire Association Meeting
Will be Held at
Atlantic City, N. J.
October 18th to 22nd, 1937

Proposed Pittsburgh Regional Meeting of the Wire Association

IT is expected that a regional meeting of the Wire Association under the auspices of a local Pittsburgh committee, will be held at the William Penn Hotel some time during the latter part of May.

✦ ✦ ✦

ARRANGEMENTS are now being made for two exceptionally interesting research papers, one being devoted to wire production and the other to cold heading work, and open discussions will be held on each paper immediately after their presentation.

✦ ✦ ✦

THIS is a new venture for the Wire Association and the local group sponsoring the meeting will have every cooperation and assistance from the secretary of the Association in developing an interesting and satisfactory session.

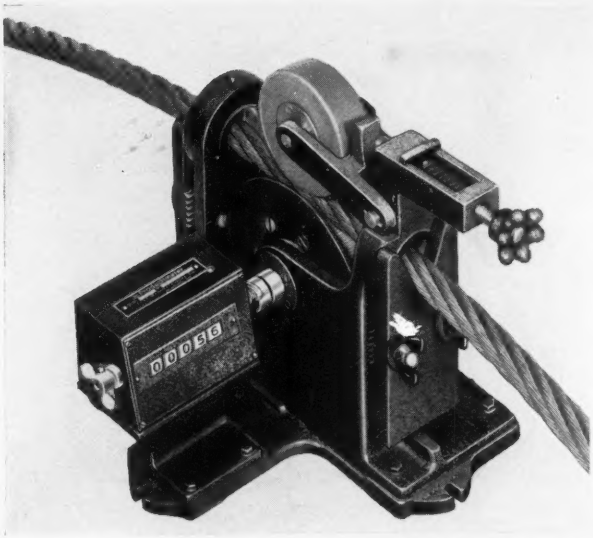
✦ ✦ ✦

DEFINITE announcement of the plans will be made in the May issue of "WIRE AND WIRE PRODUCTS" and printed notices of the meeting will be sent in advance to the members and their guests in sufficient time for them to make their plans to be present.

✦ ✦ ✦

Pump Industry Standards

THE seventh edition of its Standards for the pump industry has just been published by Hydraulic Institute. The enlarged publication has been completely rewritten and rearranged and much new material has been added, such as a new pump test code, charts for figuring friction of petroleum products in pipe lines, specific pump speed curves, pressure-temperature curves for pumping hot water and chart showing resistance of valves and fittings to flow of fluids. Recommendations of materials to be used in pumps handling various liquids, instructions for installing and operating different types of pumps, and much other material has been revised and brought up to date.



A New Heavy Duty Wire Measuring Machine

Productimer L-20 is a fast, accurate, rugged machine for lineal measuring of wire and cable $\frac{3}{16}$ to $1\frac{1}{2}$ in. dia. Maximum speed is over 5000 ft. a minute. Top reading counter is L-21, Compact in size and readily mounted anywhere. Ball bearing throughout. Instantaneous braking.

Send for Bulletin 3 on Wire Measuring Machines, including smaller models for bare or insulated wire or cable .005 to .5 in. dia.

DURANT MFG. CO.
1928 N. Buffum St., Milwaudee, Wis.
180 Eddy Street, Providence, R. I.

News and Notes of the Spring Industry

(*Continued from page 215*)

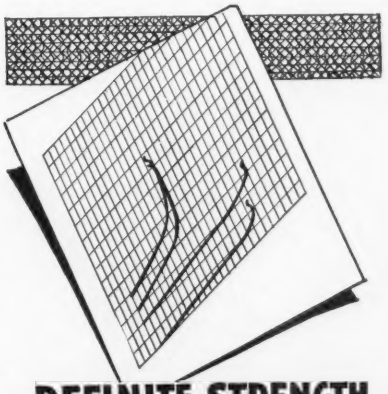
IN addition to discussing the characteristics of the many spring types, numerous problems in designs are actually worked out for easier understanding. The subject matter is clearly indexed and conveniently grouped for reference.

✦ ✦ ✦

RESEARCH and laboratory experiments have always been a strong suit in these two spring plants and the results are apparent in the tables and formulas which have been compiled for quick accurate use.

✦ ✦ ✦

THE B-G-R sourcebook represents a large investment in time and experience and should be valuable for the help it can give in buying or designing springs. It will be sent without obligation to any executive, engineer, designer, or purchasing agent who requests it on his business letterhead.



DEFINITE STRENGTH & STRETCH RECORDS of WIRE YOU SELL or BUY

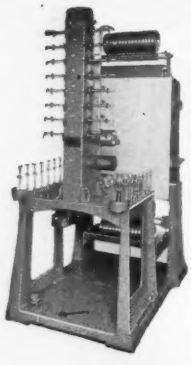
HENRY L. SCOTT Co. PROVIDENCE, R.I.

SCOTT TESTERS

Exports and Imports of Wire

(*Continued from page 205*)

total of 14,588 tons being mostly of shapes (5,981), solid and hollow bars (3,529), 'other' hoops and bands (1,483), and sheets, skelp and sawplate (1,429). Next was India (5,404 tons) which confined its participation solely to pig iron, following which came the Netherlands (5,091 tons) in a trade made up mostly of pig iron (4,642), and ferro-manganese (282). France (3,671 tons) followed, the predominating products being shapes (1,815), solid and hollow bars (1,046), and 'other' hoops (603). Next was Sweden (3,107), the chief products being wire rods (1,475), round iron and steel wire (279), sponge iron (279), solid and hollow bars (279), and flat wire and steel straps (254). Germany (3,063)—whose sales have been at a very much lower rate in recent months — was sixth and sent in mostly barbed wire (1,316), nails, tacks and staples (580), 'other' pipe (225) and pig iron (200).



AIMCO R-16 MODEL
WIRE ENAMELING MACHINE

Enamels Wire 36 B. & S. Gauge and Finer.
Electrically Heated Oven with Thermostatic Control.
Finished Wire Spindles Individually controlled.
Traverse is Adjustable for Different Spool Dimensions.
Low Cost of Enameling Wire is Due to Ease of Operation and Number of Spindles one Operator can tend.
Self-Contained on Bed-Plate.
Motor Driven.
Motor included.

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"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
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WIRE BRAIDING MACHINES

SINGLE, DOUBLE OR TRIPLE DECK
VERTICAL OR HORIZONTAL TYPE

Designed and constructed to insure an efficient and profitable output.

Write for complete information today.

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CHICAGO OFFICE—20 NORTH WACKER DRIVE

BECOME QUALITY — CONSCIOUS BY USING RUSCH DIAMOND DIES

RUSCH WIRE DIE CORPORATION

275 SEVENTH AVENUE, NEW YORK, NEW YORK

The All-American Made Diamond Die

CARD CLOTHING was received to the extent of 24,657 square feet valued at $37,177 in comparison with 38,493 square feet valued at $54,820 in the earlier month, and came from the United Kingdom (21,530 square feet valued at $32,458), Belgium (2,093 square feet and $3,047), Germany (835 square feet and $1,152), and Switzerland (200 square feet and $520).

✦ ✦ ✦

WIRE CLOTH AND SCREENING receipts aggregated 108,798 square feet (89,774 square feet in December) and were supplied by Germany (79,150), the Netherlands (14,764), Canada (14,425), and France (459).

✦ ✦ ✦

IMPORTS OF WIRE HEDDLES in January amounted to 1,217,000 pieces (803,000 pieces in December) and came from Belgium (516,000), France (500), and Germany (201).

✦ ✦ ✦

FOR the second consecutive month, no trade resulted in WIRE FENCING AND NETTING, galvanized before weaving. Of the galvanized after weaving, Germany (45,000 square feet) and the United Kingdom (8,000 square feet) were the suppliers in a trade totaling 53,000 square feet which compared with 40,000 square feet received in the previous month.

✦ ✦ ✦

THE January total for FOURDRINIER AND OTHER PAPER - MAKING WIRE was 34,357 square feet (41,154 square feet in December), and was supplied by Austria (14,300), Germany (10,063), Sweden (8,896), and France (1,363).

✦ ✦ ✦

Exports and Imports of Wire

EXPORTS of iron and steel wood screws during January, 1937, totaled 16,582 gross valued at $2,550. Of this total Mexico took 2,869 gross valued at $324; Cuba 2,068 gross valued at $196; Peru 1,940 gross valued at $206; Argentina 1,760 gross valued at $186; Panama 1,410 gross valued at $210; Philippine Islands 1,415 gross valued at $420; Brazil 1,191 gross valued at $139; Canada 1,086 gross valued at $278.

EXPORTS of brass wood screws during the same month totaled 6,295 gross valued at $2,118. Of this total Brazil took 1,602 gross valued at $387; Argentina 1,155 gross valued at $335; United Kingdom 858 gross valued at $425; Venezuela 613 gross valued at $316; France 451 gross valued at $23.

✦ ✦ ✦

IMPORTS of wood screws during the same month totaled 47,125 gross valued at $2,613. Of this total Japan supplied 45,085 gross valued at $2,123; Belgium 1,390 gross valued at $277; Germany 650 gross valued at $213.

✦ ✦ ✦

New Detroit Warehouse for Firth-Sterling Steel Co.

FIRTH-STERLING Steel Company, McKeesport, Pa., has completed plans for the construction of a new warehouse in Detroit, which will double its facilities for supplying steel to automobile manufacturers and other industries in the Detroit area.

✦ ✦ ✦

THE warehouse, which will be of the most modern type of construction, will make it possible to carry a complete stock of stainless steel, tool steel, and die steel, as well as sintered carbides. This new building, in addition to warehousing, will provide the facilities for local treatment of sintered carbides and will also house the company's Detroit district offices.

✦ ✦ ✦

THE Firth-Sterling Steel Company makes tool steels, stainless steels, and sintered carbides, with its plant at McKeesport, Pa., branch offices at New York, Chicago, Hartford, Cleveland, Detroit, Los Angeles, and Philadelphia. The company is the only tool steel maker with its own tungsten mine, which is in Colorado.

The 1937
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Will be Held at
Atlantic City, N. J.
October 18th to 22nd, 1937

Learn about PARALAN

Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

Write for further information. We may be able to solve your difficulties.

AMERICAN LANOLIN CORP.
LAWRENCE, MASSACHUSETTS

S & H IMPROVED STRAIGHTENING and BUNDLING MACHINES

Available in Four Sizes. To straighten stainless steel, phosphor bronze, hard drawn and music wires from .005" to .250"

WRITE FOR COMPLETE INFORMATION TODAY.

SLEEPER & HARTLEY, INC.
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Famous Wire Drawing Diamond Dies

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Does your product bear a distinctive trade mark? If so, can you prevent competitors from using it? Have you registered it in the United States Patent Office? A patent on the product is not necessary in order to register its trade mark in the Patent Office. Write us for information on trade marks and the Federal registration that entitles you to display with your trade mark, the notice "Reg. U. S. Pat. Off."

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That Makes It Unanimous.

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WIRE & WIRE PRODUCTS
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FOR DRY AND WET DRAWING

Wire Drawing Soaps

Successfully meet recent special demands made by high-speed drawing and the added attention given to brightness and finish.

Send for special Wire Drawing Bulletin.

FOR FERROUS, NON-FERROUS WIRE

MAGNUS CHEMICAL COMPANY 188 South Avenue, Garwood, N. J.

Corporation Surtax to Hamper Re-Employment — Long Range Trend of Job Security Depends on Corporations Able to Earn and Retain Profits, Say Business Economists

LABOR'S job security and purchasing power will be impaired by the enforced distribution of corporate earnings under the 1936 Revenue Act, according to the forecast of Allen W. Rucker and N. W. Pickering, prominent business economists. A recent analysis, published by Farrel-Birmingham Company, Inc., under the title of "The Coming Effect of the Surplus Tax on Factory Employment" shows factory unemployment since 1923 to be concentrated in industries and states where corporation profit probabilities are lowest or declining fastest.

✦ ✦ ✦

POINTING out that Massachusetts, New York, Rhode Island, Connecticut, Pennsylvania and New Jersey have suffered a decline in factory employment opportunity dating from 1923, the two economists show that this shrinkage has been coincident with the shrinkage in the percentage of corporations able to earn and retain a profit in the same period. A cross-analysis by industrial groups reveals five industries—Textiles, Leather, Forest Products, Stone, Clay and Glass, and Steam Railroads—in which diminishing employment occurred during the prosperity period, 1923-1929. Without exception, those were the only industries in which the percentage of profitable corporations were below or declining faster than the national average.

✦ ✦ ✦

"WHEN the trend of the percentage of corporations earning a profit is compared to the trend of factory employment, it becomes quite clear that in those industries and those states wherein industry finds it most difficult to earn and retain some surplus, employment suffers directly and substantially, even in prosperous times.

✦ ✦ ✦

"THE present Revenue Act as now drawn must have the effect of enforcing a distribution of surplus that otherwise might be invested in either recouping losses of the depression or improving plant and equipment and providing a 'cushion' for the next depression.

✦ ✦ ✦

"THE number of concerns enabled to so act inevitably determines the number of going concerns over the long term; and the total of factory employment is almost directly proportionate to going factories.

✦ ✦ ✦

"AT least two vital modifications and amendments to this Act are required in the interests of the national economy:

"An amendment exempting from the surtax that portion of corporation earnings which have been invested during the year in capital equipment and/or which have been applied to capital losses incurred during the periods immediately preceding;

"A revision to provide for computation of statutory loss on the basis of recognized sound accounting principles instead of the present method of arbitrarily disallowing certain expenses and losses and thereby forcing the payment of an income tax when in reality no actual income has been earned."

The 1937
Wire Association Meeting
Will be Held at
Atlantic City, N. J.
October 18th to 22nd, 1937

FOLDED PAPER FLATS
PAPER INSULATION YARNS
TWISTED "CELLOPHANE" YARNS
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3rd & Somerset Sts. Phila., Pa.

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ZINC WIRE
ZINC STRIP
THE PLATT BROS. & CO.
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RUESCH
Machinery For
Wire, Tube, And Brass Mills
409 Mulberry St., Newark, N. J.

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WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames—16" Frames, 8" Frames —Take-Up Frames, Wire Pointers—Puller Tongs.
General Castings for Wire Mill use. Circulars on Request.
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CONTINUOUS ROD MAKING
STRAIGHTENING AND POLISHING MACHINES
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HIGH SPEED
Welding Wire Straightening and Cutting Machinery
Round Wire Straightening and Cutting Machinery
Flat Wire Straightening and Cutting Machinery
Roll and Rotary Wire Straighteners
THE F. B. SHUSTER CO.
New Haven, Conn.
Straightener Specialists Since 1866

FOR SALE
High speed double covering insulating machine twenty heads. Size range from 16 to 36 gauge. Specifications furnished upon request.
Address Box 21
c/o WIRE & WIRE PRODUCTS
17 E. 42nd Street New York, N. Y.

Carboloy Grinding Chart

CARBOLOY COMPANY, INC., Detroit, Michigan, manufacturers of cemented carbide tools, dies and wheel dressers announces the publication of a new grinding chart, #GC-71.

✦ ✦ ✦

THIS 18 x 12 wall chart presents, in condensed form, the most efficient methods for grinding single point Carboloy tools. It contains recommendations on grinding wheels, diamond wheels, diamond lapping discs, wheel speeds, rough and finish grinding procedure, and methods for hogging off stock rapidly. This chart supplements the demonstrations given throughout the country by Carboloy Company during 1936 on the latest, most economical, rapid grinding technique. Copies of this chart, #GC-71, may be obtained by writing Carboloy Company, Inc., 2985 East Jefferson Avenue, Detroit, Michigan.

✦ ✦ ✦

Production of Barbed and Woven Wire Fence, 900,000,000 Lbs. In 1936

ENOUGH barbed wire and woven wire fence were produced by the steel industry last year to supply 1,000 feet of one or the other to each of the 6,800,000 farms in the country, it is estimated by the American Iron & Steel Institute.

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ABRASIVES—
Norton Co., Worcester, Mass.

ANNEALING POTS AND BOXES
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

ANODES—Nickel
Seymour Mfg. Co., Seymour, Conn.

ANTI-RUST—
Magnus Chemical Co., Garwood, N. J.

ARMORING EQUIPMENT
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Seymour Mfg. Co., Seymour, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS—Rod and Wire
Lindberg Engineering Co., Chicago, Ill.
Morgan Construction Co., Worcester, Mass.
Morrison Engineering Co., Cleveland, O.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CEMENT FLOOR CLEANER—
Magnus Chemical Co., Garwood, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
Amaloy Division of American Machine and Fdry, Co., New Ydrk, N. Y.
American Chemical Paint Co., Ambler, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Parkin Co., The Wm., Pittsburgh, Pa.

CLEANERS—Hand and Metal
Magnus Chemical Co., Garwood, N. J.

CLEANING & PICKLING EQUIPMENT
Broden Construction Co., Cleveland, O.
Duriron Co., The, Dayton, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.
Amaloy Division of American Machine and Fdry, Co., New York, N. Y.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.

COMPOUNDS—Cleaning
Oakite Products, Inc., New York, N. Y.

CONDUITS—Iron and Steel
Youngstown Sheet & Tube Co., Youngstown, Ohio.

CONTROLS—Automatic
Leeds & Northrup Co., Philadelphia, Pa.

CRANES—Block Stripping
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

CRANES—Cleaning House
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

CRANES—Electrical Traveling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

CRANES—Wire Mill
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTERS—
Porter, H. K., Inc., Everett, Mass.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIES—Diamond
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Co., New York, N. Y.
Driver Harris Co., Harrison, N. J.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Union Wire Die Corp., Stamford, Conn.
Vianney Wire Die Works, New York, N. Y.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Union Wire Die Corp., Stamford, Conn.
Vianney Wire Die Works, New York, N. Y.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Union Wire Die Corp., Stamford, Conn.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.

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Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Union Wire Die Corp., Stamford, Conn.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEER—Consulting Wire Mill
Lewis, Kenneth B., New York, N. Y.

EQUIPMENT—Galvanizing
Meaker Company, The, Chicago, Ill.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FILLERS—Paper for Cable
E. W. Twitchell, Inc., Phila., Pa.

FURNACES—Annealing
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Automatic
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.

FURNACES—Hardening and Tempering
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
John Robertson Co., Brooklyn, N. Y.
Surface Combustion Co., Toledo, O.

FURNACES—Non-Oxidizing
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Normalizing
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Wire, Strip and Sheet
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

GALVANIZING—Special Process
Meaker Company, The, Chicago, Ill.

GEARS—Wire Mill
Farrel-Birmingham Co., Ansonia, Conn.

GRINDERS—Roll
Farrel-Birmingham Co., Ansonia, Conn.
Norton Co., Worcester, Mass.

HANDLING EQUIPMENT—Material
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

HOISTS—Electric Traveling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

HOISTS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.
Parkin Co., The Wm., Pittsburgh, Pa.

INSTRUMENTS—Electrical
Leeds & Northrup Co., Philadelphia, Pa.

INSULATION—Cable or Cable Filler
E. W. Twitchell, Inc., Phila., Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Warner Company, Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Magnus Chemical Co., Garwood, N. J.

LUBRICANTS—Wire Drawing
Magnus Chemical Co., Garwood, N. J.
R. H. Miller Co., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Machinery Co., Philadelphia, Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Coilers
Broden Const. Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Waterbury-Farrel Foundry & Machine Co. Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cold Heading
Ajax Manufacturing Co., Euclid, O.

MACHINERY—Copper Wire Drawing and Rolling
Elevator Supplies Co., Inc., Hoboken, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Covering Wire—
Syncro Machine Co., Newark, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster Co., New Haven, Conn.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Electro - Galvanizing Wire
Meaker Co., The, Chicago, Ill.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa
Elevator Supplies Co., Inc., Hoboken, N. J.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Meaker Co., The, Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis., and Providence, R. I.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works Co., Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Machinery Co., Phila.
Elevator Supplies Co., Inc., Hoboken, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila. Pa.
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Special—Combination Machine for Drawing, Cutting-to-length, Straightening and Reeling Bars from Coil in One Operation (Shumag Type)—
W. A. Schuyler, New York, N. Y.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Elevator Supplies Co., Inc., Hoboken, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

BUYERS' GUIDE, Continued

Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
Elevator Supplies Co., Inc., Hoboken, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Wire
Henry L. Scott Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Ajax Manufacturing Co., Euclid, O.
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Elevator Supplies Co., Inc., Hoboken, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.

MACHINERY—Wrapping Wire
W. A. Schuyler, New York, N. Y.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MONORAIL SYSTEMS—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

OVENS—Annealing or Drying
Lindberg Engineering Co., Chicago, Ill.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Co., The Wm., Pittsburgh, Pa.

POTS—Annealing, Case Hardening and Tempering
Lindberg Engineering Co., Chicago, Ill.

POTS—Lead Melting
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

PYROMETERS—
Leeds & Northrup Co., Philadelphia, Pa.

RECORDERS—
Leeds & Northrup Co., Philadelphia, Pa.

REEL AND TENSION STAND—
Sleeper & Hartley, Inc., Worcester, Mass.

REEL CRUTCHES
Watson Machine Co., Paterson, N. J.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Morrison Engineering Co., Cleveland, O.

RODS—Wire—Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLLS—
Farrel-Birmingham Co., Ansonia, Conn.

RUST PROOF COMPOUND
American Lanolin Co., Lawrence, Mass.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SKIN PROTECTOR—
Magnus Chemical Co., Garwood, N. J.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
R. H. Miller Co., Homer, N. Y.

STRIP—Brass, Zinc and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—Wire
Henry L. Scott Co., Providence, R. I.

TOOLS—
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Proof
Duriron Co., The, Dayton, O.

VULCANIZERS
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Co., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Company, Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel and Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Seymour Mfg. Co., Seymour, Conn.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., St. Louis, Mo.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Brass, Zinc
Platt Bros. & Co., The, Waterbury, Conn.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

THE WATSON MACHINE COMPANY

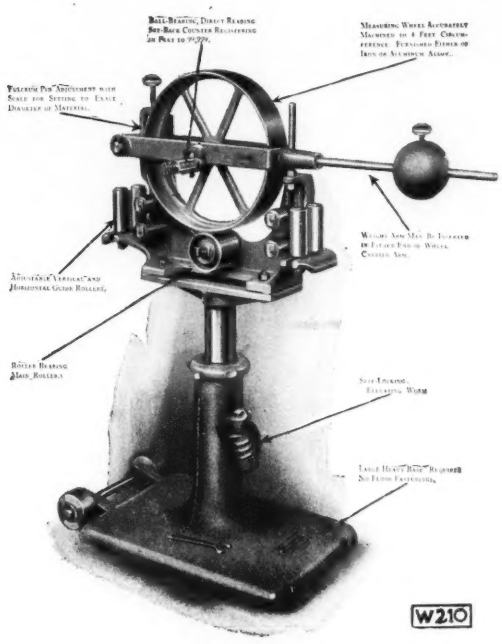
ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ENGINEERS - FOUNDERS - MACHINISTS

WIRE MEASURING MACHINES

Our Standard for years and still in demand



Made in two sizes: DC-2 for diameters up to 1″, and DC-3 for larger diameters up to 3″.

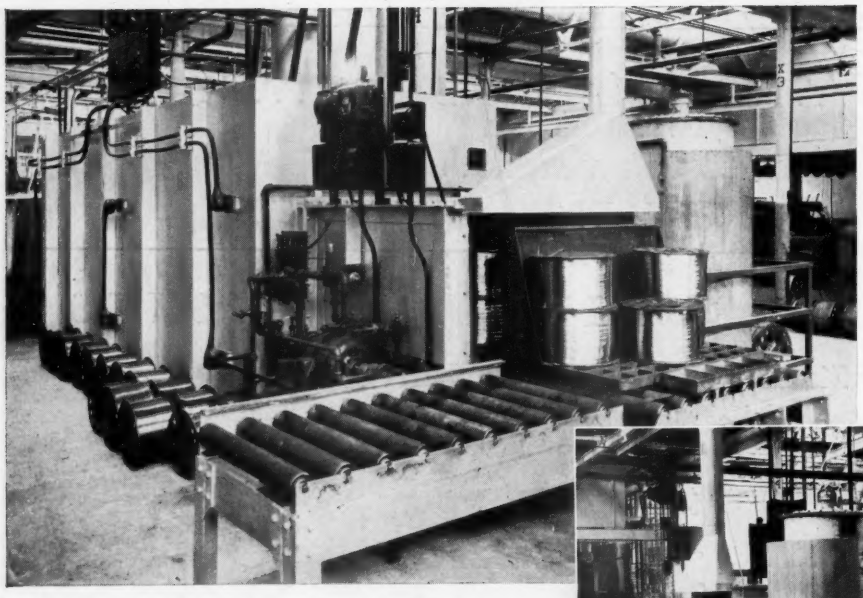
Three types of Measuring Wheels: Hardened Steel for galvanized and hard surface wires; Semi-steel for bare wire; and Aluminum for covered wire.

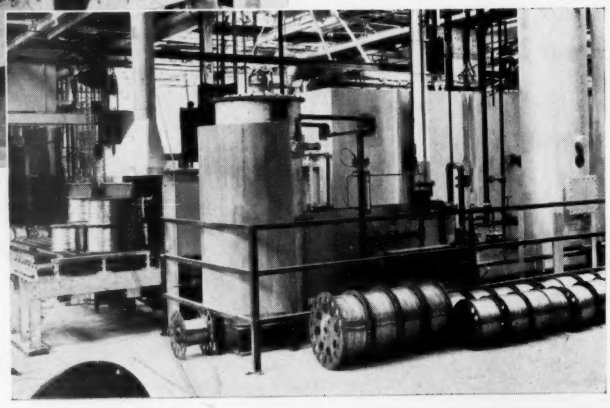
Machines furnished without Floor Stands for table mounting.

Smaller Measuring Machines, suitable for wires below ½″ diameter, also manufactured—ALL SIZES CARRIED IN STOCK.

Send for bulletin for full details.

ELECTRICAL WIRE AND CABLE—WIRE ROPE AND CORDAGE MACHINERY





Special Atmosphere Continuous Furnaces for

Bright Annealing Wire

Uniformly, Economically and Continuously

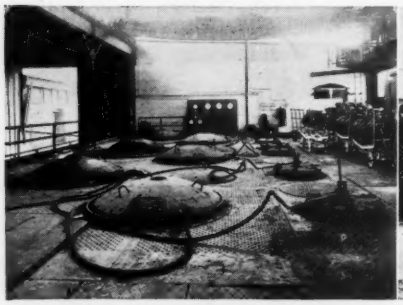
Wire from the finest gauges to the heaviest sizes is bright annealed uniformly, economically and continuously in special atmosphere furnaces of the type shown above.

Coiled wire, as well as wire on small spools and large reels, is successfully handled in this equipment. No water seals or vapor of any kind is used, thus staining is entirely eliminated and no drying necessary. The wire is discharged from the furnace uniformly annealed, absolutely bright and dry, ready for shipping, further processing or fabricating. The above is one of several types of electric and fuel-fired furnaces we have developed and built for bright annealing ferrous and non-ferrous wire.

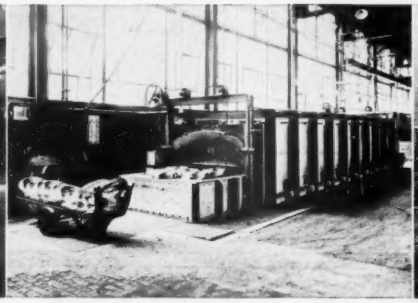
Other recent installations include furnaces for bright and clean annealing brass and copper wire, improved pit type furnaces for normalizing rod and bright annealing steel wire in coils, as well as furnaces for scale-free hardening bolts, springs, etc., billet heating, bright annealing tubing, strip, stampings; carburizing, copper brazing and other heating and heat treating processes.

If you are interested in improving the quality of your anneal or heat treatment, increasing production or are contemplating any changes or additions to your furnace equipment, our engineers will be glad to work with you. We specialize on building production furnaces to fit the customer's specific requirements.

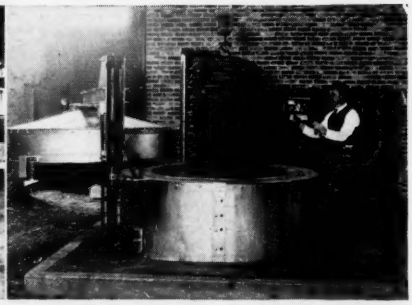
The Electric Furnace Company, Salem, Ohio



Gas-fired pits for bright annealing wire and normalizing rod.



Continuous conveyor type, gas-fired furnace clean annealing wire in coils.



Electrically heated pit type furnace for annealing special alloy wire.